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The Sea Coast.

NEW subjects present more interest to the Briton than the sea. The dreams of youth may be outlived, but the sea remains a source of pleasure and profit for some, of toil and sorrow for others, a royal highway for commerce, and a bond connecting the scattered States of the Empire. Perhaps a feeling of proprietorship in the waters that flow around our shores may be natural, yet the land itself claims regard and protection. So when slice after slice is swallowed up by the waves, a bit of cliff here, a field or two there, and a general nibbling along miles of coast-line, it is high time to suggest that the sea, old friend and trusty ally though it be, should keep in its proper place. Many suggestions of the kind have been made in past years and are still being made, their practical application being attended with varying degrees of success. Those of our readers who are interested in the subject of sea coast protection will find much valuable information in a recently-published volume* from the pen of Mr. W. H. Wheeler, M.Inst.C.E., for many years Harbour Engineer to the port of Boston, in Lincolnshire.

The treatise now under consideration may be said to consist of two parts, the first dealing with the phenomena calling for the construction of defensive works and gradually leading up to a discussion of sea walls and groynes, while the second part contains an exceedingly complete description of the sea coasts of England.

In the particular branch of marine engineering with which we are for the moment concerned, there is much difference of opinion among experts on questions of theory and practice. This is not to be wondered at, for physical conditions are never precisely the same in any two places, and it is not infrequently the case that a local engineer, who has studied the peculiarities of some particular portion of the coast, is in a position to offer better advice than a committee of experts having wider experience but less local knowledge. The author does not advocate any special methods of protection for general adoption, but devotes himself to giving such information as may be of service to all who may be interested in the preservation of land bordering on the sea. All land above the level of the sea is continually being worn away by waves caused by wind and tide on the one hand, and by the agency of rain and frost on the other. In each case the material brought down to the shore is added to the beach, and so forms a natural protection to the coast. But the value of the material for this purpose depends entirely upon its character, and in many places the destruction of cliffs is unaccompanied by any appreciable compensation. Along such portions of the coast the need of artificial protection is clearly indicated. Chalk cliffs such as those at the eastern end of the English Channel are easy prey for the waves; and as popular seaside resorts exist there in an almost unbroken line, protective works are very much in evidence. Continual waste also goes on along the Hampshire and Dorsetshire coasts, but the infrequency of towns on the seaboard renders protection less necessary. Incidentally, this adds to the charm of such districts for lovers of Nature, who can there escape from the disfiguring, if useful, handiwork of man. Along much of the East Coast, from the Thames to Flamborough Head, the cliffs suffer from constant erosion, which must be vigorously resisted in the interests of numerous watering-places. In some parts low-lying land requires protection, and earthen embankments or sea-walls then become necessary. Those parts of the coast mentioned above serve to exemplify every variety of coast protection as practised in this country, while very little aid of the same kind is needed on the shores north of Flamborough Head and on the western side of the island, owing to the harder and more durable character of their geological formation.

In chap. ii. of Mr. Wheeler's book attention is given to the laws governing the action of shore waves, and to the manner in which such waves act on a beach or sea wall. Even in the calmest weather the waves or wavelets derived from the swelling of the tide are never absent from the shore, and their influence on the movement of beach material can never be neglected, for upon the breaking of each wave the particles assume a horizontal position and serve to transmit mechanical force, capable of transporting material. Then the tidal wave of the ocean moves with greater velocity in the open sea than in shallow water, and so an oblique lateral motion is caused along the shore, the effect of which must be considered. In addition to the effect produced by the direct stroke of a wind wave on the shore, similar destructive action is due to translatory movement of the water below the wave itself, and the long waves due to a ground swell exert a greater power of transmission near the bottom than ordinary wind waves, while their destructive effect is generally far greater. The effects of breaking waves, the movement of material at great depths, and the power of waves occupy the remainder of the chapter, wherein many instructive and very interesting facts are recorded. Amongst other illustrations of the power exerted by the sea, the author mentions that during a heavy gale 4,500,000 tons of shingle were torn down from the Chesil Bank, the greater portion being restored after the gale had ceased; and that during the construction of the Plymouth breakwater no less than 200,000 tons of stone blocks, weighing from 7 tons to 9 tons each, were removed in a single night from the sea slope of the breakwater at low-water level, carried over the top, a distance of 138 ft., and piled up on the inside.

Littoral drift, forming the subject-matter of the next chapter, is the movement of the material constantly taking place along the shores of a tidal coast owing to the action of the waves, and is a most important factor for consideration. Apart from large accumulations that have taken place during past ages under conditions essentially different from those now prevailing, the shingle drifting along the coasts of this country is

* "The Sea Coast." By W. H. Wheeler, M.Inst.C.E. London: Longmans, Green, & Co. 1902.

strictly limited in quantity. As Mr. Wheeler says, "the wear and tear of the sea cliffs does little more now than supply the waste which is always going on from the perpetual action of the waves." There is no other source of supply, and the caution that a limit ought to be placed on the removal of material for commercial purposes is one we entirely endorse. The area of the country is being gradually but surely reduced, and every ton of material taken away from the

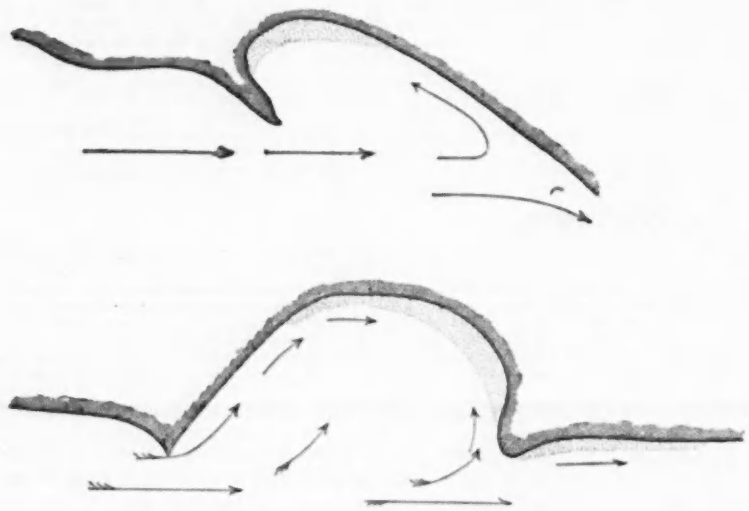


Fig. 1.—Plan Showing Direction of Drift in a Bay.

shingle and sand of the beach aids the process, and brings nearer the time when towns and villages will join those already swallowed up by the sea. It is worthy of remark that while shingle is banked up on the beach and carried along the shore, sand is generally stationary. On the Lincolnshire coast there is no appreciable littoral drift or alteration of form. Sand does not accumulate against the piers or groynes which extend across the shore, and the general outline of the beach remains as it has always been, so far as any record exists.

A most important matter is the direction of travel exhibited by beach material, this being influenced by the direction of the flood tide, and the configuration of the coast. On a straight line of coast, littoral drift takes place in the direction of the main flood tide, but where bays and indentations exist there is no continuous drift along the shore, as the characteristic shingle of each bay is retained by headlands acting as natural groynes. Action of this kind is shown by the following diagrams taken from Mr. Wheeler's work (fig. 1). In the first of these, the tide passing the projecting headland strikes the shore opposite, and forms a counter-tide, drifting material towards the sheltered part of the bay; in the second illustration, the tide in the offing moves faster than that in the bay, and, reaching the farther headland before the bay tide, curls round to form a reverse current. The drift of shingle is then in opposite directions, and, according to the shape of the bay, it collects in the lower end or in the centre. Still more important than the influence of headlands is the outcome of the struggle between littoral drift and water flowing and ebbing in estuaries and rivers. In some cases the drift is unable to cross the tidal currents, and, turning round the coast line, may drift up the shores of the estuary, and in others, where the movement is stronger than the force of the current, rivers may be diverted, blocked by bars, or entirely closed; or, again, the drift may be pushed out across an estuary in the form of a promontory.

Having disposed of preliminary considerations, the author enters upon the subject of sea walls, and it may be remarked at the outset that some divergence of opinion exists among experts as to the relative advantages of upright and sloping walls. In this country the upright wall is generally in favour, while in Holland and Belgium the sloping form is preferred.

Although walls for harbour purposes can hardly be compared with those intended for coast protection, yet it is worthy of note that when the relative merits of sloping and upright walls were investigated by the Commission appointed to inquire into the proposal to construct a harbour of refuge at Dover in 1846, most of the engineers and other experts consulted were strongly in favour of the upright form. Mr. Wheeler gives an excellent *résumé* of the conditions that should attach to walls for cliff or shore protection, and at the same time points out how difficult it is to meet the specified requirements. When a vertical wall, situated above the level of low water, is struck by a wave in a more or less broken state, the projection of water upwards concentrates its action at that part of the wall where the consequences are most serious. Thus, the effect of the water, whether falling at the back of the wall or upon the beach, is to cut out material, and so to cause weakness. One important advantage possessed by upright walls is mentioned by the author, namely, that the materials used are placed to the greatest advantage, so that the weight of the superincumbent mass assists in keeping the lower stones in their places. It is also true that vertical surfaces tend more to reflect waves than to break them, and that they offer no resistance to the upward stroke of the waves. The concave form of section has frequently been adopted, with the hope of neutralising the effect of an incoming wave by the water of the previous wave thrown off from the wall. As the author remarks, this result is not attained in practice, and, moreover, a concave wall does not prevent erosion of the beach by falling water. The concave form is also open to the objections that a large quantity of material is placed at the upper part of the wall where little horizontal force has to be resisted, and that the upper part of the curve offers a large surface to the upward force exerted. From some examples of sea walls contained in the succeeding chapter we have selected the diagrams following, to illustrate the absence of advantage in connexion with the concave form of construction. Fig. 2 shows the old and new walls at St. Mildred's Bay, Westgate. The former is indicated by dotted lines, and was destroyed in consequence of water, thrown upon the roadway, having washed out the tar pavement and chalk filling at the back of the wall. The new wall, as will be seen by the continuous lines in the diagram, has no concavity and appears to answer its purpose satisfactorily. Fig. 3 represents the wall built some twenty years ago at Clacton-on-Sea. Here, the effect of the waves thrown

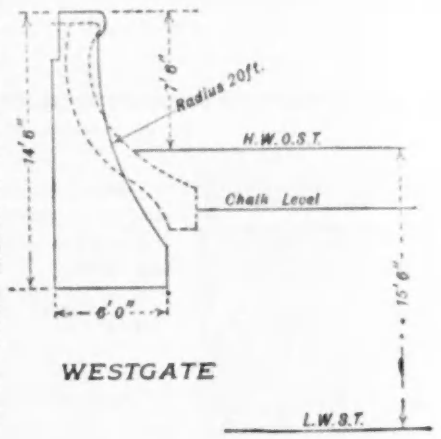
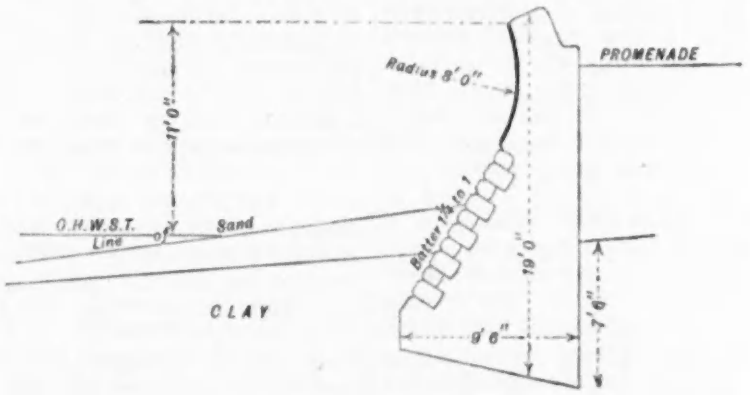
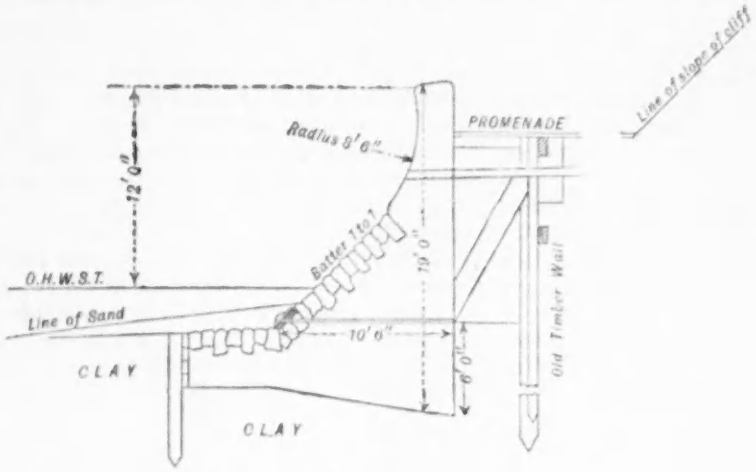


Fig. 2.—Sea Walls at Westgate.

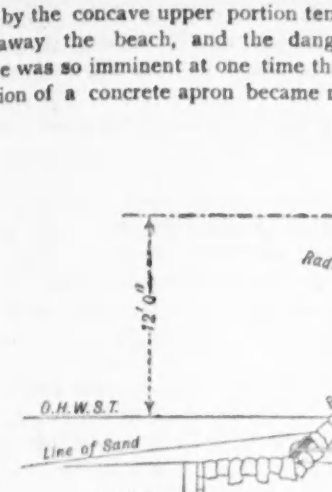


CLACTON ON SEA
OLD WALL
Fig. 3.

back by the concave upper portion tends to cut away the beach, and the danger of failure was so imminent at one time that the addition of a concrete apron became necessary. On reference to fig. 4, it will be seen that a more recent wall at Clacton has been designed with a curve of greater radius, and that precautions have been taken for the preservation of the foot of the structure. A projecting nosing is even more undesirable than concavity, and numerous instances could be cited where such projections on sea walls have had to be removed. In some cases the masonry has been severely shaken, in others heavy copings have been lifted by the sea; and at Ramsgate a nosing built with the object of throwing off water caused disintegration of the chalk, and so denuded the beach that the wall had to be underpinned for the greater part of its length. Some engineers advocate the construction of walls having steps in front, as fig. 5, the idea being to



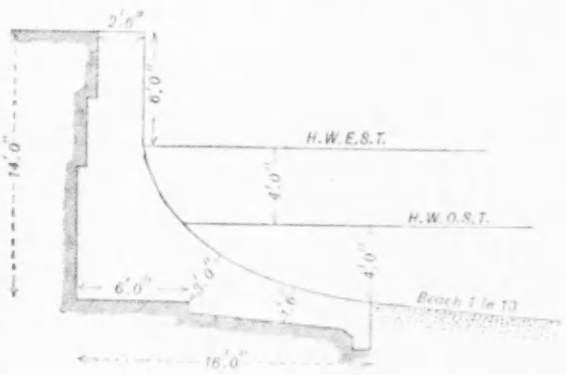
CLACTON ON SEA
NEW WALL
Fig. 4.



BRIDLINGTON.
Fig. 5.—Sea Wall.

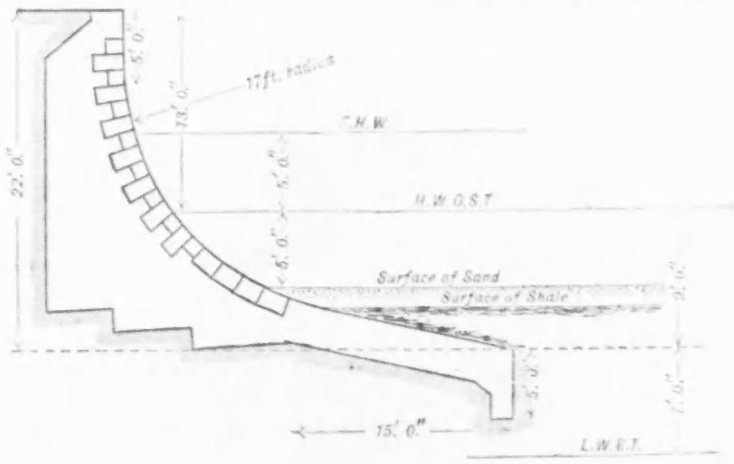
break up the force of the waves and to minimise the effect of return water upon the beach. The chief objections entertained by the author to a wall of this form are that a broken surface is offered to the waves, and that the successive courses of stones have not the advantage of superincumbent weight as in a vertical wall. This criticism is clearly justified, but it does not appear that the section is otherwise disadvantageous. Sloping walls suffer even more than concave walls from the absence of superincumbent weight, and from the fact that they necessarily extend further seaward than upright walls. Consequently, wave effects are experienced earlier and for longer periods, water is forced into all the interstices, stones are loosened by oscillation, and when loosened they are easily sucked out.

The most effective form of wall, according to the author, is shown by fig. 6, and there is much to be said in favour of this section. It will be observed that the curve dies out at the bottom into a slope natural to a beach composed of shingle, but when the beach is formed of sand the toe may be extended further seaward by an apron of flatter gradient, protected at the end by sheet piling. In either case the object is to lead water from the wall and back to the beach with the least element of disturbance, and without cutting out material at the toe. The elliptical form, corresponding to the natural curve of a shore wave, is well calculated to change the direction of the particles of water from the horizontal to the vertical in the easiest possible manner, and the vertical portion of the wall does not tend to lead the water over the top to the roadway. The sea wall at Scarborough (fig. 7) somewhat resembles the author's design at first sight. It will be seen, however, that the curve is not elliptical, and that the vertical portion has less height, while in its original state the wall was without the apron shown in the diagram. Mr. Wheeler makes no direct remarks upon the suitability of the section, but in the chapter dealing with examples of sea walls we read that "in heavy gales the waves break with great force on the wall, the water being thrown over the top and falling on the roadway." Soon after the completion of the Scarborough wall the beach was scoured out, and within a year the shale in places was scooped out to a depth of 3 ft., so that an apron 15 ft. wide was added to protect the toe. Thus it becomes evident how great may be the effect of comparatively small differences in the conformation of sea walls, and how unsatisfactory may be the operation of a wall that is apparently of correct design.



Scale 1 inch=10 feet.
Fig. 6.—Section of Sea Wall.

So far as the question of strength is concerned, it is well known that mathematical rules cannot be absolutely relied upon even in the case of ordinary retaining walls, while they are still less useful as applying to sea walls. The author wisely relies on experience as the best guide for the proportions of sea walls, and says that the mean width of section should not be less than one-half the height above the permanent beach level, while this proportion must be increased to as much as three-quarters the height if mud pressure has to be withstood. The height of the top of the wall above the beach must be governed by the circumstances of each particular case, the general rule being that it



SCARBOROUGH
Fig. 7.—Sea Wall.

should be impossible for any wave to break directly over the top. It is naturally desirable that the material for facing upright walls and for pitching sloping banks should be of hard and durable character. The author points out the suitable nature of concrete for the former purpose, owing to the absence of joints and the smooth surface presented, and directs attention to the growing popularity of columnar basalt for facing slopes. The advantages of the latter material have been fully proved at several places both on the Continent and in this country, where it is found that the hexagonal shape of the blocks facilitates keying of the stones in a satisfactory manner.

Groynes are considered in chap. vi., which is the last of the explanatory portion of Mr. Wheeler's book. Although groynes do not in themselves act as protections to a coast, yet they conduce to the preservation of the land by aiding the collection of shingle banks. Little advantage is to be expected from the application of such structures where there is no material to be collected, or where wasting cliffs afford no fresh supplies; but where favourable conditions exist the effect of suitable groynes is to diminish littoral drift, and so to prevent denudation of the beach. On sandy shores, as we have already mentioned, there is little movement of the sand, except during the flood tide, and especially during heavy gales. The value of groynes in such places is chiefly exemplified in the prevention of "lows," and low groynes formed across sandy beaches tend to fill up the hollows converting wet soft surfaces into firm sands.

It is on shores where shingle is to be found that groynes are most useful, but, as Mr. Wheeler clearly demonstrates in a paragraph on the effect of groynes upon wave-action, their value must not be overestimated. He shows that the destructive force of the waves is increased rather than diminished by high groynes, for the water is projected upwards, and in falling cuts out and erodes the beach. Again, if the groynes project much above the beach and are placed at short intervals, water thrown into the bays must be of increased height, and in retiring will have proportionately greater power for mischief, this influence being intensified when eddies are caused by waves driven into the bays by the action of wind, and when water pours from the heaped-up shingle on the windward side of the groyne. While the author takes care to define the limitations of groyning, he fully admits the advantages to be derived from such work, if properly designed and executed. Some useful information may be derived from his remarks upon the construction of groynes. On the question of spacing, he expresses the very sensible opinion that experience of local circumstances must be the chief guide for determining the intervals that should exist. If placed too near together, groynes may constitute a source of danger to boatmen, and completely spoil the appearance of a beach, besides altering the long easy slope into a series of short, steep banks, bringing antagonistic forces into play. The opinion expressed that groynes should not be multiplied more than is absolutely necessary is confirmed by experience in several well-known watering-places. Amongst these may be instanced Folkestone, Littlehampton, Hastings, Southwold, and Yarmouth, places where single piers, jetties, or groynes have led to the accumulation of beach material for considerable distances, and to such depths that old and unsightly groynes have in some cases been completely covered by shingle or sand. So far as height is concerned, the author is right in stating that "the less the height of the planking of groynes rises above the beach, the less the effect of the waves in disturbing and eroding the beach." High groynes are naturally costly to construct and to maintain, while less effective in collecting material than low groynes raised from time to time as the beach is built up. Sometimes, indeed, a beach may be accumulated to a sufficient degree by the use of temporary structures, and afterwards maintained without artificial aid. Thus we see how important it is to the ratepayers of seaside districts that reliable advice should be secured before heavy expenditure is decided upon for protective works. That the most appropriate treatment is not always proposed by eminent engineers is proved by the experience of Dymchurch. The famous old earthen bank, made by the Romans for the protection of Romney Marsh, was formerly supplemented by huge groynes, formed of stone blocks secured between timber piles. These were not effectual in protecting the bank, and in 1803 Mr. Rennie was consulted on the subject. Under his advice the sum of

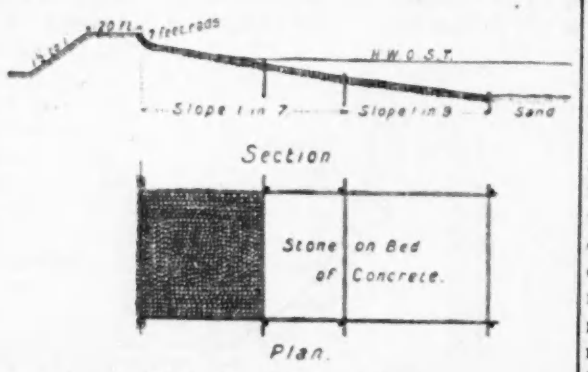
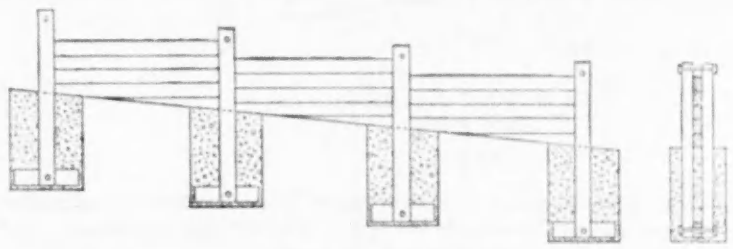


Fig. 8.—Sea Wall, Dymchurch.

56,000*l.* was expended in "arming" the wall west of Dymchurch with brushwood, and the result was that shingle soon began to disappear from the beach. About 1837 the bank was pitched with stone (as shown by fig. 8, which is reproduced from Mr. Wheeler's book). As shingle and sand still continued to recede, the pitching and piling were carried forward until the slope had attained the length of 150 ft. at the east end, and 80 ft. at the west end, the total length so protected being three miles, and the area of the stone-faced slope about 40 acres. During the past century the wall has been a constant source of expense and worry to the authorities. In 1859, 18,000 sq. yds. of pitching was destroyed, and between 1870-90 no less than 68,296*l.* was expended in defence works. In 1891, 40,000 sq. yds. of pitching was washed away, and in 1893 so much damage was done that Sir J. Wolfe Barry and Mr. Matthews were called in to advise the Commissioners. These eminent engineers proposed the restoration of the wall and the construction of forty-three heavy groynes, at a cost of 41,000*l.*, but their recommendations were opposed by the late Mr. Case, the Engineer to the Board, who possessed the singularly appropriate title of "expenditor" of the bank. Mr. Case showed that in 1892 there were holes in the face of



CASE GROYNE

Fig. 9.

the bank, below the pitching, from 4 ft. to 5 ft. deep, that the foreshore had been wasting away ever since the bank had been paved, and that the pitching had worked its own destruction by scour at the base. His advice was that the expensive scheme advocated by the Westminster experts should be deferred, and that a system of low timber groynes should be placed along the beach at right angles to the bank, commencing with a rake of 1 in 12, and ultimately assuming the natural inclination of the beach at low water. The construction of the groynes is illustrated in fig. 9, and their effect has been to build up the foreshore to the natural inclination of repose, so that it is now undisturbed by gales, and to convert the beach from an expanse of mud and sand with pools of water to a well-consolidated mixture of shingle and sand. The total cost of repairing the bank and constructing the groynes between 1894-1899 was 19,000*l.*, and although this sum does not represent the end of the expenditure, it is manifest that the Commissioners were well advised in accepting the proposals made by their own engineer. In commenting upon the Case system, Mr. Wheeler says the principles involved are correct, except one which dictates the stopping of the groynes at the mean high-water line. He adopts the reasonable opinion that the waves running round the ends of groynes so designed will tend to scour out the beach and to form lows parallel with the coast. As we pointed out a year or two ago, the system adopted by Mr. Case does not differ essentially from well-known methods of groyning, and the patents which were taken out by Mr. Case referred chiefly to constructional details.

With the expression of some general conclusions as to the proper design of groynes, the first part of Mr. Wheeler's work draws to a finish. To the general reader the second part will appear more interesting than the first part, and to the engineer it will certainly be not less useful. We cannot

attempt to deal in any comprehensive manner with the mass of facts presented by the author, but brief reference to a few points will serve to show the value of his records. The detailed account of Lyme Bay, extending from Start Point to Portland Bill, is well worth reading. Here the cliffs have been worn back some twenty-five miles from the straight line. There are numerous bays each with its distinctive quality of shingle. At the east end is that remarkable natural breakwater known as the Chesil Bank, and at Portland Bill, Hopes Nose, near Torquay, and at Brixham are still to be found the remaining portions of a beach formerly existing ten miles further seaward than the present shore line. The alteration of natural conditions that may be caused by the construction of harbour works is evidenced by the fact that since the completion of the Portland breakwater the tendency of shingle has been to leave the beach protecting the northern part of Weymouth and to drift southwards. Consequently the sea threatened to force its way across the low-lying land to the backwater and so to convert the town into an island; while on the other hand, the sea-wall erected to protect the front of the town, before the breakwater was built, became almost covered with shingle. The suicidal policy of assisting encroachment by removing material from the beach for building purposes is illustrated by the case of Swanage, where the sea has encroached 60 ft. in sixty years, buildings on the shore have been destroyed, and the waves at ordinary high tides break against the road running parallel with the shore for nearly a mile. An example showing the permanence of sand and shingle banks, when natural or artificial changes have not been made in the coast line, is afforded by the author's description of the Hurst Castle shingle bank, which has retained the same general outline and position for centuries. At Selsey and Pagham the vagaries of the sea are illustrated. The ancient cathedral once to be found at Selsey is covered by the sea, and the deer park belonging to the Bishop of Chichester in the time of Henry VIII. is now in an anchorage with three fathoms of water, marked on the charts as "The Park." Pagham Harbour, on the contrary, is now completely closed, the land having been reclaimed under an Act passed in 1875, and the channel, which once had a depth of 40 ft., is filled up with shingle. The harbour is still shown on published maps, though its site has long been covered with green fields. In describing the extraordinary precautions taken for the protection of Brighton, the author says the beach is provided with the most elaborate and expensive system of groyning to be found on the South Coast, the average expenditure on groynes being stated at 2,500*l.* per annum. Unfortunately, the only result has been the collection of several triangular spits of shingle, while the natural features of the beach have been entirely destroyed. Mr. Wheeler justly criticises the methods of groyning adopted, pointing out that the groynes impede the use of the beach by visitors, rendering it dangerous for children, while affording inadequate protection to the sea wall. He suggests that the present unsightly structures are not likely to attain the end to be sought by groynes erected on a proper system. The authorities at Brighton would do well to study the contents of Mr. Wheeler's book, and they might then understand that huge masses of concrete and vast expenditure do not necessarily bring success. As the beach at Brighton has suffered from the lengthening of the pier at Shoreham, so has Seaford suffered from the construction of groynes at Brighton; but by the building of a sea wall and groynes shingle is being accumulated along the beach of Seaford Bay. The towns of Eastbourne, St. Leonards, and Hastings suffer from the adoption of short, high groynes, which have the effect of collecting shingle in a very uneven manner over the beach. Mr. Wheeler cites facts showing that the high groynes favoured in these places are as useless for preventing denudation as in moderating the force of the waves. At Bexhill, where low timber groynes have been adopted, the shingle is maintained in a manner affording complete protection to the sea wall, even, as Mr. Wheeler says, after exceptionally heavy gales. Hythe and Seabrooke afford two contrasting examples of protective work. At Hythe the beach became much denuded owing to the neglect of the groynes, and a few years ago a concrete wall was built, nearly a mile long and 15 ft. high. At the east end of the wall a single groyne was constructed of timber and concrete, and this structure has resulted in the accumulation of a shingle beach reaching nearly to the top of the sea wall, the shingle tailing out almost to the west end of the wall, burying all the old groynes and leaving a fine level beach. At Seabrooke a number of high groynes have been erected, with the result that shingle has accumulated at the west, but not at the east, end. Shingle accumulates on the windward side of these groynes, leaving the other side bare; and the absence of beach material at the east end of the shore led, in 1898, to the cutting out of the roadway and the breaking down of the sea wall.

Leaving the South Coast, the author turns his attention to the Eastern shores of England, and gives detailed consideration to the Yorkshire coast, where towns, villages, and lands have been carried away by what our forefathers quaintly and somewhat plaintively termed "the wrongdoing of the sea." On the Lincolnshire coast, below the mouth of the Humber, the beach has extended seawards for a distance of two miles, and fifty years ago a large tract of land was enclosed by two earthen banks which needed no special protection and are now buried under blown sand. This constitutes one of the rare examples along the English coast where the shore is growing owing to the deposit of alluvial matter. Much destruction has been caused at Sheringham, largely in consequence of a high groyne erected by a local landowner on the westward side of the town. It was stated at a recent inquiry that several houses had gone into the sea, that one landowner had lost 30 acres, and that 2 acres were swept away during a single storm in 1897. Moreover, the beach has become denuded of shingle and sand to a considerable extent, so that the waves strike against the sea wall. The groyne which has caused all this injury was duly sanctioned by the Board of Trade in 1894, and it is to be feared that the District Council neglected to oppose its construction at the proper time, as the Board of Trade is generally ready to give every consideration to objections of a reasonable nature. Cromer, once an inland hamlet in the parish of Shipden, has taken its place on the sea coast since the "biting sea ate up Shipden," the parish church of which was swept away in the reign of Henry VIII. The author's account of the groynes constructed at Cromer and Overstrand is well worth reading. Down the coast to Waxham, near Yarmouth, there has been great loss of land, but to counterbalance this the tract of land known as the Broads, covering an area of 250 square miles, has been recovered from the sea, which formerly extended an arm up to the "fishing town" of Norwich. A few miles further south of Yarmouth are the remains of Dunwich, the former capital of Sigebert, King of the East Angles, and the seat of a bishopric. In the time of Elizabeth four out of six churches were eaten up, and the remains of the last one now stand but 10 yards from the edge of the cliff.

An instance of the care necessary to avoid injudicious interference with the natural drift of beach material is furnished by the case of Landguard Point. Before the beginning of last century a rocky ledge acted as a groyne, preventing the excessive southward movement of shingle across the mouth of Harwich Harbour. Then cement makers came, and by the year 1844 some 200,000 tons of stone had been removed by them for the manufacture of Roman cement. A preliminary incident in 1808 was the destruction of two Martello towers and a small battery. Then the shingle ridge on which Landguard Fort stands began to extend until the high-water line receded to a distance of 2,650 ft. from the fort, and the depth of water in the channel became reduced from 7 fathoms to 7 ft. A massive groyne was then formed round the point and the further progress of the shingle was arrested, but the complete stoppage of the drift prevented the gradual working of a portion of the shingle round the point into the harbour. Consequently, the beach inside the harbour became so denuded that the destruction of the fort appeared to be probable, and with the object of guarding against this danger some planks of the groyne were removed to allow a portion of the material to escape. The effect of this treatment was satisfactory so far as concerned the fort, but a shoal afterwards collected across the mouth of Felixstowe Dock, necessitating the construction of other groynes. All this trouble was clearly due to the removal of stone for commercial purposes by persons who were in no way legally responsible for the injury done. Another instance of the mischief worked by the removal of material from the coast is to be found in connexion with the Beacon Cliff, at Harwich. The beating of the waves on the promontory caused the denudation of septaria stones, which, falling on the beach, formed a natural groyne. At the beginning of the eighteenth century Roman cement makers coveted these stones, so that at one time from 100 to 200 boats and 500 men were engaged in taking them away. Presently the cliff began to waste. By 1800 120 ft. was washed away, the vicar's field and glebe and 40 acres of land, part of a battery, and several houses vanished; and in 1824 a house, mill, granary, and stables followed. By 1841 nearly 250 ft. of the cliff had disappeared, the harbour was deprived of a natural breakwater from south-west gales, so in 1847 an artificial break-

water had to be constructed by the Government. Careful readers of Mr. Wheeler's book may be able to pick out other examples showing that disregard of the national estate has not yet wholly disappeared, as well as others demonstrating the regrettable effects following neglect of protective measures, and the dangers accompanying ill-advised action on the part of public bodies. On the West Coast Southport is a remarkable example of a town built on sandhills, extending two miles out from the original coast line. South of Southport many farms lie buried beneath the sandhills, one, known as the "Lost Farm," having been visible in 1826. The Western shores of England and Wales need comparatively little protection owing to the durable nature of the cliffs, but the account of these coasts given in the work before us is very well worthy of perusal, and the same remark applies to the concluding chapter, devoted to the seaboard of Northern France, Belgium, and Holland.

In expressing a general opinion on the volume, we are in the somewhat unusual position of being able to say that Mr. Wheeler has written a book which will probably be appreciated by the intelligent public as much as by those professionally interested in the subject of coast protection. It contains a wonderful collection of facts, forming most interesting matter for the general reader, and an invaluable series of records for the guidance of the engineer.

NOTES.

The Sonning Bridges.

THE reports which have been made public as to the proposed proceedings of the Oxfordshire County Council with regard to the three small bridges within their county, near Sonning, mark the commencement of what, if it is not strenuously opposed, will prove another step in the progressive disfigurement of the scenery of the upper Thames. It appears that by a majority of one vote (17 to 16), the Council decided that it was necessary to rebuild the bridges in question, and (so far as at present appears) left the work to the discretion of the County Surveyor, who wished to proceed at once with the work, without even requiring from him any drawing of the proposed new bridges. Of course one knows what that will probably mean—the erection of iron girder bridges of the usual type. We do not, in saying this, necessarily discredit the opinion that the idges require rebuilding. We have not had the opportunity of examining them recently; but the statement as to their dilapidated condition is very likely quite correct; and we are certainly not in favour of keeping up dilapidated bridges on account of their picturesque character. In such a utilitarian class of structure, stability comes before picturesque character. But there is not the slightest reason why new bridges over the Thames should be ugly or should spoil the scenery. There is no necessity that they should be iron girder bridges at all, in the first instance; on a small scale very good and durable bridges may be built of stone and timber; and there is no necessity that their design should be left to an official surveyor whose education has probably never led him to consider the question of beauty in structures. Appoint an independent architect to act with the Surveyor, and to put into a pleasing form the Surveyor's structural demands, and there is no reason why the three bridges should not be rebuilt in such a manner as to give no ground of complaint to the lovers of Thames scenery. The difficulty is to induce County Councils and other official bodies to give any attention to this side of the subject. [Since the above remarks were written we have had Mr. Holman Hunt's eloquent protest in the *Times* of Tuesday, and beneath it the letter from a member of the Oxfordshire County Council, assuring us that the new bridges will be lattice girders, and therefore "light and elegant in appearance." After that, of course, there is no more to be said!]

County Council Tramways.

THE practical completion this week of the first section of the London County Council's slotted conduit system of electric tramways is an event of considerable importance to the public. Although the Council has obtained the ablest expert advice, yet their scheme has been criticised very severely in several of the electrical papers. In one respect, however, the critics are proved to be wrong, as the work of reconstructing the line between Tooting and the Plough, Clapham, has not been nearly so difficult as they prophesied. This has partly been due to the way in which the local authorities helped the contractors by giving them permission at various places to divert the course of the tracks so as to avoid the necessity of removing large water-pipes, &c. The main point on which critics lay emphasis is that the conductors inside the conduit are supported from the bottom of the conduit instead of from the top or from the sides. They must therefore be a hindrance to effective drainage, and one would expect that the accumulation of dirt round them would lead to very considerable leakage of the current, especially on damp days. In several towns in America where, owing to the fact that overhead systems are absolutely prohibited, conduit systems are universal great difficulties have arisen from this cause. The American critics also suggest that trouble will arise from the closing of the ¾-in. slot, as the yokes have in their opinion not been subjected to a sufficiently rigid test. The Westinghouse Company proposed to put in yokes which would only close ½-in. when subjected to a pressure of 43,000 lbs. The County Council were satisfied with yokes which did not close more than $\frac{1}{16}$ in. when subjected to a pressure of 6,000 lbs. There certainly is a great discrepancy between the American and the English tests. The results of the actual working of the line will soon settle these points, and prove whether Dr. Kennedy or his critics are in the right.

Wages.

To those who seriously consider the effect the high wages demanded and paid in this country must have on our foreign trade, with the competition now prevailing in foreign markets, the recent Board of Trade Return will be read with the greatest interest, and it is somewhat gratifying to observe that the continued increase in the rate of wages seems to have reached its height, and that, for the first time since 1895, a slight decrease can be recorded. It is true the net weekly decrease of 77,000*l.* is very small when the total amount of wages paid in this country is considered, especially in view of the enormous increases of late years, the weekly increase for 1900 alone being some 209,000*l.*; and, moreover, the present decrease is limited to certain industries, the mining and metal trades, wages in which, no doubt, have been inflated by the pressure of strikes. In all other industries the increase appears to continue, but it is curious that any decrease at all should have occurred at a time when many of the wage-earning population were absent from this country at the war, and when competition was consequently lessened. A satisfactory feature in the Report is the fact that despite the decrease, such as it is, strikes have not been prevalent, and the tendency to resort to arbitration and Boards of Conciliation is very apparent. It is obvious that if this country is to retain her foreign trade there must be a limit to the continued increase in wages, which is almost entirely due to greater luxury in the standard of living, and it is a point gained if our people have at last recognised a fact which goes to the root of their very existence.

Housing of the Whitehaven Poor.

IN his report upon an outbreak of enteric fever in the Borough of Whitehaven, Dr. H. T. Bulstrode makes the following remarks as to the housing of the Whitehaven poor:—

"Wherever one turns, whether out of the small or the large thoroughfares, one finds deplorable courts and alleys where the direct rays of the sun are but rarely seen, and where even its diffused light is often difficult of attainment. The alleys all too frequently consist of narrow channels often not more than 3 ft. to 3½ ft. across, on either side of which the houses face one another. The alleys are approached by narrow passages which pass either through or by the side of the houses facing the streets, and it is immediately behind this front row of houses that the alleys are found. At the further end of the alley there is commonly another house; and hence it comes about that these alleys are practically closed at both ends, while the sides are composed of the two and of the three-storied houses, which are separated from one another by only an interval of some 3 ft. to 3½ ft. Any odd nook or corner has to serve for the water-closet, or where no such space is available the convenience is situated at some distance from the alley. The houses situated in these alleys are frequently either back to back or they have no back light, and hence the amount of light which is to be obtained on the ground floor of these dwellings is extremely small. The 'overlooking' which is a consequence of this overcrowding of dwellings upon area necessitates the drawing down of blinds when anything approaching domestic privacy is desired. The demand for dwelling-houses which obtained at the time of Whitehaven's greater prosperity is apparently responsible for the present overcrowding of houses. It was then—there being at that time no proper building by-laws in force—that the gardens and backyards belonging to the houses then existing were given over to the enterprising builder, who soon converted every available patch of ground into a court or alley. The overcrowding which has resulted is almost unique in my experience."

We are afraid that this description would apply to the houses of the poor in many other towns. There is, it appears, great difficulty in procuring freehold land in the vicinity of Whitehaven. Houses are also difficult to procure, and for an empty abode there is much competition. In Dr. Bulstrode's opinion, it is difficult to imagine a place better fitted for the application of Part II. of the Housing of the Working Classes Acts than Whitehaven. The removal here and there of the most insanitary and obstructive buildings would effect an enormous improvement as regards light and air, and he

suggests that a small sub-committee of the Corporation, with their officers, should inspect the town with the view of ascertaining whether Part II. of the Housing of the Working Classes Act, 1890, might not be applied in certain cases.

Hartlebury Castle, Worcestershire.

IT is stated that Hartlebury Castle, near Stourport, appertaining to the See of Worcester is about to be sold, and that a part of the proceeds will be given to the endowment of the proposed new See of Birmingham. The Castle has been a residence of the Bishops of Worcester during a very long period. Burthred, King of Mercia, granted the manor to them in the year 853. In or about 1253, Bishop Walter de Cantelupe began to erect the fortified Episcopal residence which his successor, Bishop Gifford, completed and surrounded with a moat, the gatehouse was added by Bishop Carpenter. Having been captured from the Royalists, under Lord Windsor, by Colonel Morgan in the course of the Civil War, the castle was dismantled and for the greater part demolished—the keep excepted — and sold for 3,000*l*. Bishop Hough erected a large portion of the present residence in the reigns of George I. and George II., and Bishop Hurd demolished the keep to make way for his alterations, 1781, which include the library, wherein he stored the books of Warburton and of Pope. Some years previously Bishop Maddox had refitted the chapel, filling the windows with stained glass. The grounds are tastefully laid out, and contain some fine old timber. Bishop Stillingfleet planted, two hundred years ago, the avenue, chiefly of limes, which forms the approach to the castle. The Ecclesiastical Commissioners have purchased Lansdowne House, Worcester, as an episcopal palace. Rickman, of Birmingham, rebuilt, in 1836-7, the body of the parish church of St. James at Hartlebury, which Bishop Gifford had erected in 1269; the tower added by Bishop Sandys, 1575, and the modern chancel were left. We may mention that the sale by the Ecclesiastical Commissioners will perhaps be forestalled, as some residents in the diocese contemplate the collection of a fund which would in effect preserve the castle for uses of the diocese whilst relieving the occupant of the see from the heavy cost of its maintenance.

The Mersey Bar.

DURING the past twelve months the amount of work carried out by the engineering department of the Mersey Docks and Harbour Board has been greater than in any previous year. A large proportion of the work is due to the comprehensive scheme of dock extension sanctioned by Parliament a few years ago, but a very considerable amount of money has been expended in dredging operations at the bar and in the river. Some idea of the struggle against the forces of nature may be gathered from the statement that nearly five million tons of sand were removed from the bar, and the shoals in the Queen's and Crosby channels, within the last year. Since the commencement of dredging in 1890, the total quantities removed amount to more than sixty-two million tons, about twenty-eight million tons being taken from the bar, and the remainder from the channels mentioned. The engineer to the Board states that the satisfactory condition of the bar has been fairly maintained during the year, the average depth in the dredged cut being about 27 ft. at low water spring tides. These figures enable one to realise how heavy is the tax imposed upon the Port of Liverpool by the natural conditions of the estuary.

The Architectural Association.

THE lecture work of the Architectural Association for the coming session will be carried on by the lecturers and instructors of last year, except that the subjects previously taken by Mr. F. R. Farrow have been divided between Mr. Banister F. Fletcher, Mr. C. E. Varndell, and Mr. A. M. Watson. The annual meeting of the Association (the opening meeting of the session), will be held on the 3rd prox., when the President (Mr. H. T. Hare) will deliver an address and distribute prizes; and the conversazione, to be held at the Royal Institute of Painters in Water Colours, will take place on October 31. The following is the programme of ordinary meetings:—October 17, Mr. T. R. Spence on "Homer and Architecture"; November 7, Mr. F. C. Eden, "Roof Coverings"; November 21, Mr. C. C. Brewer, "Sanatoria for Consumptives"; December 5, Mr. J. S. Gibson, "Architectural Practice, Real and Ideal"; December 19, Mr. W. H. Bidlake, "The Study and Delineation of Old Buildings." January 9 (subject to be announced); January 23, Mr. J. Dudley Forsyth, "The Attitude of the Young Architect towards the Crafts"; February 6, Professor G. Baldwin Brown, M.A., on "What is the Real Value of Greek Work to the Modern Artist?"; February 20, Mr. H. H. Statham, "The Æsthetic Treatment of Modern Bridges"; March 6, Messrs. H. B. Creswell and A. W. S. Cross, on "Competitions"; March 20, Mr. W. Henry White, "Ancient and Modern Town Houses"; April 2, Mr. Banister F. Fletcher on "Palladio"; and May 1, Mr. A. Needham Wilson on "Architecture and the Public." Many of the subjects are of considerable interest and the papers should give rise to valuable discussion.

The Late Mr. Nettleship.

By the death of Mr. J. T. Nettleship we have lost not only an artist of much power and originality, but a man of general intellectual culture, whose death will be deeply regretted beyond the circle of the artistic world. Mr. Nettleship was, in fact, one of those men who might have taken up one out of several different lines of work in the world and been successful in any one of them. He made his first reputation as a literary man by his critical and analytical studies of some of the works of Browning, with whom he was on terms of affectionate intimacy, and whose fine but (to many readers) bewildering poem, "Sordello," he did much to explain and lighten up. Subsequently he made animal painting the chief object of his life, and his paintings of this class have been familiar and prominent in many exhibitions. He treated animal subjects not from the merely realistic point of view, but with the obvious endeavour to render them a medium of poetic expression; to give through them the impression of power, picturesqueness, and even of pathos. In the latter respect his striking picture of the blinded lion feeling his way along the edge of a cliff, with a troop of jackals waiting behind for their prospective prey (exhibited at the Grosvenor Gallery a good many years ago), was perhaps his most remarkable production, and will be remembered by all who saw it. Occasionally, no doubt, his aim at dramatic effect in animal painting carried him a little too far; painters will perhaps also be of opinion that his animals were not so well studied and finished in detail as they might have been; and it is possible that had he been a man of less general culture he would have been a more completely successful painter, concentrating his study more on the technique of painting. But he was a man of genius, and if not exactly a great animal painter he was always an interesting and original one.

LETTER FROM PARIS.

THE Commission of Paris Hospitals has decided to reconstruct the hospitals of La Pitié, Cochin, and Saint Louis. Some new pavilions from plans by M. Paul Renaud, Architect of the Assistance Publique, were inaugurated last month by M. Mourier, the late Director of the Assistance Publique, and these new buildings are said to be as far as is possible perfect in arrangement and sanitation.

It has now been decided, after much delay and discussion, to demolish the incomplete monumental staircase commenced by Lefuel in the vestibule of the Pavillon de Marsan at the Louvre, and thus devote the whole of the large hall to the exhibits of the new Museum of Decorative Arts.

Out of the sum of 8,000,000*l*. voted for the execution of various important work at Paris and its suburbs, it has been decided to devote an amount of 400,000*l*. to the work of completing and prolonging the Boulevard Haussmann.

A large quantity of interesting and very creditable work sent in by the winners of the Prix de Rome now studying in Italy has been exhibited at the Ecole des Beaux-Arts at Paris. M. Vermare exhibited a very characteristic and vigorously modelled figure of an aged tramp, which he entitled "L'Epave." M. Segoffin sent in a figure entitled "Man and Human Misery," a piece of work full of energy; and M. Landowski exhibited a figure of a young Italian which he entitled "A Young Hercules." Amongst the works in painting were a "Job and His Friends" by M. Leparra, and a patriotic picture, entitled "History," by M. Roger. The drawings of architecture were especially interesting; some detail drawings of the present state of the Arch of Titus at Rome, excellently drawn and coloured, were sent in by M. Tony Garnier, who this year has returned to his strictly classical studies after his "practical" outbreak of last year. The present drawings will be followed next year by a restoration of the Arch of Titus. M. Duquesne exhibited a restoration of the Thermæ of Caracalla at Rome.

The Minister of Public Works has authorised the construction of the two viaducts required at Passy and at Austerlitz for the passage of the new metropolitan railway across the Seine. The viaduct at Passy will be entirely constructed of light steelwork. It will be composed of a central passage for the railway, and two side passages for pedestrians and rolling traffic respectively. The decoration of this bridge is entrusted to M. Formigé, Architect to the city of Paris, and the estimated cost is 340,000*l*.

The Prix Bailly, awarded each year by the Académie des Beaux-Arts to the author of the best work on Architecture, has been given to M. J. Guadet, Professor of Architecture at the Ecole des Beaux-Arts, for his work entitled "Cours d'Architecture." The value of the prize is 60*l*.

The fine mansion once belonging to Queen Marie Christine of Spain, and more recently to the Duchesse d'Uzès, one of the most sumptuous properties in the Avenue des Champs Elysées, is now being demolished to give place to the usual street buildings. The decorations of the interior are remarkable, and all care will be taken in removing some of the most valuable for future depositing in one of the museums.

The Municipality of Paris has just placed the sum of 6,000*l*. at the disposal of the authorities of the Mairie of the Tenth Arrondissement for the purpose of putting into execution the

various proposed works of painting and sculpture in the interior and on the exterior of the building. Amongst the artists designated for the work are the painters, MM. Henri Martin, Delacroix, Danger, Beaudouin, and Henri Levy, and in sculpture, MM. G. Michel, Hyppolyte Lefèvre, Person, and Larch. On the façades will be placed allegorical figures representing the various trades practised most largely in this busy quarter—such as perfumery, artificial flowers, goldsmiths' work, blacksmiths' work, joinery, printing, embroidery, &c., and "Transport by Water," as a tribute to the canal of St. Martin close by.

The Municipality of Marseilles has opened a competition between architects and house-owners, similar to that of the "Concours de Façades" at Paris. Four new houses will be premiated each year, a gold medal will be awarded to each of the architects, a bronze medal to the contractors, and the house-owners will be freed from half of the municipal street taxes.

The Directors of the National Museums have installed in the Hôtel Chimay, which forms a portion of the Ecole des Beaux-Arts, an interesting and valuable collection of models of the various important monuments of the world, and some of more recent buildings. These models come from several private collections which have been purchased by the State. One of these, the Cassas collection, comprising seventy-three models, was purchased for the sum of 5,000*l.* in 1813. Amongst the models are reproductions of the Parthenon, the Tower of Pisa, the Temple of Antoninus and Faustina at Rome, the Pantheon at Rome, the Colliseum, and the Amphitheatres of Nimes and Arles. The above, together with a very fine reproduction of Notre Dame at Paris, will remain at the Ecole; the others will be distributed to the various museums.

M. Cain, the Curator of the Carnavalet Museum, is putting into execution an idea which will prove of considerable interest in the future—viz., the collection of a series of plans in relief of Paris as it exists. M. Gaston Renaud has been entrusted with the first portion of the work, which will reproduce the interesting quarter of St. Julien le Pauvre, with its remarkable little church of St. Julien and the picturesque old houses in the surrounding streets. The scale will be 1 in 100, and will permit the reproduction of the smallest details of the various buildings, some of which belong to the sixteenth century.

The new competition suggested by M. Edouard Detaille, for designs of street signs for Paris, is now opened between all artists and art workers, who have until November 15 for sending in their work. This special competition is for designs or executed work of artistic signs for hotels, cafés, and restaurants, shops, workshops, &c., to be placed either flat or in projection on the fronts of the houses at Paris. All latitude is allowed to the competitors, who may submit finished designs ready for fixing, or full-size models made of some temporary materials, or large sketches and details. The authors of all the premiated designs will receive a silver medal, and the authors of those designs specially accepted by the jury for execution will receive a sum of 320*l.* to be divided up into fourteen prizes, ranging from 10*l.* to 80*l.* in value. The Prefect announces that special liberty will be allowed as regards size and projection for all designs premiated by the jury, and that these signs shall be free from the usual taxes on signboards and similar objects.

The Prefect of the Seine has made a new appeal to inventors in France and abroad to submit practical apparatus for the suppression of the inconveniences of smoke coming from factory and domestic chimneys. All who have any apparatus to submit may send in particulars, with sketches, &c., to the Prefect of the Seine at the Hôtel de Ville at Paris, and the Prefect will make practical trials, free of all cost to the inventors, of such apparatus as appear really interesting and practical.

At the suggestion of M. Henri Roujon, Director of Fine Arts, the Minister of Public Instruction and Fine Arts has entrusted M. Emile Bertone, architect and late Prix de Rome, with a mission to Berlin for the purpose of studying the Palmyrian remains existing in the Asiatic Museum of that town.

A number of young French architects have been hoping that a general competition would be opened for plans and designs for the reconstruction of the Imprimerie Nationale. But it has been decided to entrust the work to M. Didelot, the present Architect to the Imprimerie Nationale, and he is now studying his plans for submitting to the Minister of Justice, on whom this establishment depends. M. Didelot intends to employ armoured cement for the general construction of this building. The Committee of the Imprimerie will meet frequently for the purpose of examining the plans of each portion of the establishment and making corrections and suggestions. It has been stated that it is impossible to satisfy the desire of many architects that this work should be put to competition, as it would be difficult to obtain in this way any plans which would be satisfactory as regards the special requirements and necessities of such a building as a National Printing-house. It is possible, however, that the principal façade will be put up for competition.

The Museum of Compared Sculpture at the Trocadéro is being enriched by a magnificent plaster cast of part of the Cathedral of Chartres, taken direct from the monument itself. It represents the portion of the choir commenced in the sixteenth century and terminated in the eighteenth century, the sculpture of which depicts the principal scenes of the New Testament.

The mission of M. Eugène Guillaume, Director of the Académie de France at Rome, will expire at the end of this year. The candidates for the post were M. Guillaume, M. Bonnat, the well-known painter, and M. Herbert, a late Director of the Académie at Rome. The Académie has decided to maintain M. Guillaume, and this will be the third time of his renomination for a period of six years. The old members of the Prix de Rome have asked M. Vernon, a well-known engraver, to design and execute a "plaquette" to commemorate the centenary of the transfer of the Académie de France to the Villa Medicis at Rome; this transfer took place in 1803, the centenary will therefore take place next year.

The Salon du Mobilier, at the Grand Palais du Champs Elysées, is enjoying considerable success. One of the most interesting portions of the exhibition is the collection of ceramic and porcelain exhibited by the National Manufactory of Sèvres. The objects consist of a number of large vases placed in the central avenue, and a quantity of interesting pieces placed in showcases in various portions of the Palais, sufficient to show the great progress which has been made recently by the manufactory under the combined efforts of M. Baumgart, the general manager, and M. Sandier, the technical manager, who have succeeded in renewing the various processes of manufacture, and emphasising their departure from the old routine so greatly criticised. The exhibits in the rooms reserved for the National Manufactory of Gobelins are magnificent; the managers, in order to celebrate the third centenary of the foundation of the establishment, have got together the most interesting examples of the work manufactured from the seventeenth century to the present time.

The Chamber of Rouen is considering the scheme submitted by the engineer, M. Berlier, for the construction of a tunnel under the Seine near Tancarvel. This tunnel, which will be constructed in the form generally employed by M. Berlier for his celebrated tube tunnels, reinforced with armoured cement, is a matter of urgent necessity for the requirements of communication between the two banks of the Seine at Rouen.

M. de Nolhac, Curator of the Versailles Museum, is preparing in the upper portion of the Palace, called the "Attique du Nord," four new rooms to be specially devoted to paintings of the epoch of Louis XIII. A number of battle scenes of great interest as regards documentary evidence, coming chiefly from the collection once existing in the Château de Richelieu in Touraine, will form the nucleus of the collection. Amongst other works is a portrait of Richelieu in his cardinal robes, by Philippe de Champagne, and a portrait of Anne of Austria; also a replica of the portrait of Louis XIII. by Simon Vouet. One of the most important of the documentary paintings is a large canvas representing a meeting of the Prevots and Echévins of France in 1613, the only one rescued from a dozen similar works destroyed by fire at the Hôtel de Ville of Paris during the Commune. The new rooms will be opened in September.

An admirable collection of works of art, valued at about 240,000*l.*, has been bequeathed to the City of Paris by the late Auguste Dutuit, who died at Rome in July. This collection comprises a large number of most rare and valuable objects acquired by M. Dutuit and his family in various portions of the world, consisting of Greek, Roman, and Etruscan bronzes, sculptured wood and ivory, tapestries and furniture, objects of gold and silver work, jewellery of the Renaissance period, faience of the epoch of Henri II., and several pictures by Rembrandt, Hobbema, Ruysdael, &c. M. Cain, the curator of the Carnavalet Museum, is busily employed in classifying the various objects, for according to the terms of the bequest it is necessary that the whole collection be properly installed and exhibited to the public at the Petit Palais before January 11 next, under penalty of the whole reverting to the City of Rome. M. Dutuit bequeathed also a sum of about 160,000*l.* to the Municipality, and in return for this generosity required the city authorities to take in hand the perpetual care of the tomb of his brother at Père Lachaise.

The monument to the celebrated draughtsman Gavarni, now being prepared by M. Denys Puech, will shortly be erected over the basin existing on the Place St. Georges at Paris. The monument will be very novel in design, and will consist of a lofty column supporting a gilt bronze bust of Gavarni. On either side of the column will be placed a figure of Thomas Viroloque, and figures of a Pierrot and a working woman, all faithful copies of the drawings of Gavarni. These figures, as well as the column, will be sculptured in white marble. The plinth will be formed of coloured marbles carrying four grotesque heads spouting water into the basin; these heads will be formed of pink and iridescent enamelled stoneware.

The Municipality of Nimes has voted a credit of 12,000*l.* for the construction of a new museum for that town, and put the work to competition. The present museum is in such a state of ruin that the valuable paintings contained therein run great risk of destruction. The jury, composed of M. Redon, Architect to the Louvre, and MM. Guadet and Formige, have just decided the competition and have awarded the first premium of 120*l.* to M. Max Raphael, architect, of Nimes; the second premium, of the value of 80*l.*, to MM. Meisson & Garcin, architects, of Lyon; and the third to MM. Arnaud & Muller, of Nimes and Marseilles.

The City of Paris has instructed M. Marcel, the sculptor of the group entitled "Enigme" at the Salon of 1901, to execute his group in marble, for placing in one of the vestibules of the Petit Palais.

The two new rooms at the Louvre Museum containing Egyptian antiquities have now been opened to the public, after a careful classification of the objects by M. Benedite, sub-curator. The principal object is the seated figure of an Egyptian scribe, sculptured in limestone painted red, discovered in the tomb of Skhem-Ka. Around this statue are grouped the various objects employed by the Egyptian scribes, and a number of coloured statues of wood and stone dating from the twentieth century B.C.

The Bibliothèque Nationale has just acquired a valuable manuscript containing copies of sketches in red by Leonardo da Vinci. This document was preserved at Milan until the seventeenth century, and contains also several works on the higher mathematics employed by da Vinci.

M. Fremiet, the sculptor, has been commissioned by the town of Baltimore to execute a statue of Colonel Howard, one of the companions of Lafayette in the War of Independence. This statue will be erected on one of the public squares of Baltimore.

The statue of Duguesclin has lately been inaugurated at Dinan, the birthplace of the warrior. The life-size figures of horse and man are of bronze, cast from the clay model by M. Fremiet.

The first portion of the second line of the new Metropolitan Railway at Paris, going from the Place de l'Etoile to the Place de la Nation, is now completed, and has been handed over to the authorities. This portion, comprising nine stations, from the Etoile to the Square d'Anvers, will be opened during the present month.

The annual exhibition of the works of the artists of the National Manufactory of Gobelins is now open to the public. Some interesting work is exhibited by MM. Emile Maloisel, Jacquelin, Gagnot, Berreau, Lallemand, Deluzenne, and Hanan, and a fine view of the church and campanile of St. Mark of Venice,

completed a few hours before the fall of the tower.

A new room is being installed at the Louvre Museum for the exhibition of Italian faience from the excavations of Faenza.

M. Hannotin, a well-known decorator-architect, has been commissioned by the Gobelins Manufactory to complete his accepted design for the immense carpet destined for the pretorium of the Cour de Cassation at Paris. This will be one of the largest pieces of work ever executed by the Gobelins. The finished sketches will be exhibited at the Salon of next year.

One of the most interesting of the Parisian monuments of the fifteenth century, the Hôtel de Sens, situated at the corner of the Rue Figuier, and built by Tristan de Salazar in 1500, is doomed to destruction. Offers were made a few years ago by the Paris Municipality to purchase this building, but the offer was withdrawn owing to the high price (120,000*l.*) asked by the owner.

The Minister of Public Instruction has instructed M. Edouard Detaille to complete a portion of the decoration of the interior of the apse of the Pantheon at Paris. M. Detaille has chosen for his subject "The Days of July" in the Revolution of 1830.

M. Guilbert, architect of the celebrated chapel of the Rue Jean Goujon, for which he obtained the medal of honour at the Salon of 1900, has now completed his plans and designs for the erection and decoration of the Armenian chapel, commissioned by M. Martacheff, of Tiflis. This chapel will be erected at one extremity of the ground once occupied by the ill-fated bazaar in the Rue Jean Goujon. The work is being started, and will, if one may judge by the drawings, be as striking in originality and design as the chapel of the Bazaar de la Charité. The two curved wings will be continued around the building, for according to the Armenian ritual the chapel should be isolated from any contiguous building. M. Guilbert took his inspiration from the celebrated church of Akhtamar, a *chef d'œuvre* of Armenian architecture, and will add his own special characteristics in design to the general form of plan and decoration taken from the above church as a model.

The fine monument to Lafayette in the Square Gambetta, in the precincts of the Louvre, will shortly be inaugurated for a second time. The whole of the work, including the equestrian statue and the pedestal, is at present formed of plaster only. The sculptor, Mr. Bartlett, is completing his final work, and Mr. Hastings is preparing the white and coloured marble pedestal.

The monument to Pasteur, completed after the models left by the late M. Falguière, is now finished, standing at the entrance of the Avenue de Breteuil at Paris. The whole of the monument is composed of white marble. The pedestal was executed after designs by M. Charles Girault, architect of the Petit Palais. Pasteur is represented seated, draped in the flowing folds of a toga; the surrounding group is composed of the figures of a mother and her daughter offering their gratitude to Pasteur, whose science has saved them from a lingering disease. The figure of Death, conquered, is seen cowering and dragging his scythe behind him. Three groups, composed of oxen, grape gatherers, and shepherds, decorate the sides and back of this important monument.

The bas-relief by M. Allar, representing Victor Hugo speaking before the Assembly, has just been cast in bronze, and will now replace the plaster bas-relief placed temporarily on the pedestal of the Victor Hugo monument on the Place Victor Hugo at Paris. As soon as this is done, the work of surrounding the monument by a decorative stone balustrade will be undertaken by M. Formigé.

The Académie des Sciences has awarded the Prix Borcin, of the value of 100*l.*, to M. Lacombe, late Senator, for his work on the responsibilities of labour accidents.

Mme. Falguière, the widow of the eminent sculptor, has instructed M. Marqueste to prepare designs for a small monument to be placed over the tomb of the sculptor in the cemetery of Père Lachaise. The figure proposed and sketched out by M. Marqueste is that of a young girl standing in a pensive attitude against the tombstone, representing "Inspiration."

A large slab of bronze has just been cast for placing on the pedestal of the monument which is being raised to Charles Garnier, in the courtyard of the Opera House. This slab will bear no inscription, but simply a plan of the Opera House engraved in the bronze. M. Pascal considers that this simple plan would be better than any inscription to the renown of the late architect of the Opéra. The date of the inauguration has not yet been fixed.

THE CONSTRUCTION OF SANATORIUM BUILDINGS FOR CONSUMPTIVES.*

ALTHOUGH the ordinary principles of hospital construction are involved in the erection of sanatoria for consumptives, there is a wide divergence of their respective requirements in many details. It is premised that tuberculosis in its early stages only is usually dealt with in such institutions, in the hope of ultimate success; the majority of such cases are able to move about, few being in a quite helpless condition. Provision is not often made for surgical cases, and dispensing being a minor matter the general arrangement of the building is modified accordingly.

In dealing with the primary consideration of site I do not purpose referring to climatic conditions, including altitude and proximity to the sea, which are beyond the scope of these notes, but there seems to be a consensus of opinion upon the desirability of a site possessing the following advantages:—1. Abundance of pure fresh air; 2. A maximum amount of sunshine; 3. Shelter from winds; 4. Dry and well-drained soil; 5. Remoteness from roads or ground productive of dust; 6. Privacy and quiet, away from all smoke or noisy factories; 7. Grounds of sufficient extent to permit of walks. The presence of pine trees affords grateful shade, and is by some deemed essential. A southerly or S.S.E. aspect is most desirable as a rule.

For the disposition of the buildings there is no accepted standard plan; rather the reverse, with great varieties of type, governed by ideas of the projectors and local circumstances; roughly, however, they may be placed in four groups:—1. The large self-contained block; 2. The connected pavilion type; 3. The disconnected pavilion type; 4. The châlet system. Of the first group (or self-contained block) a well-known example is that of Hohenhonnef Sanatorium, in the Rhine district. Five stories in height, it has a central building with two wings inclining forward at obtuse angles, the dining-hall being a projection at the rear.

Of very complete arrangement, it includes† besides the dining-saloon, reception-room, reading-room, music-room, billiard-room, winter gardens, medical officer's department, inhalation-room, lifts, as well as the bedrooms, douche-rooms, &c., with a verandah around the sunny sides, and small balconies over. The verandah is in front of the basement, and so does not affect the patients' rooms, the roof being at the ground-floor level forms an uncovered fresh air gallery.

It will be noticed that large provision is made for social re-union and amusement of the patients, a matter upon which opinions are at variance. Under the same head would come Wehrawald in Baden, described by Sir Lauder Brunton‡ as "the most perfect model yet built of what such a sanatorium ought to be." It has "a central building five stories high for the reception of patients, and two wings projecting backward at either end. Both these wings are only one story high, so that they do not interfere with a free current of air around the main building. "One wing is devoted to the medical department, and the other to the dining-room, offices, kitchens, &c. A verandah runs the whole length of the front, and below it is an arcaded passage for bad weather use. Above the ground floor the plan is almost a parallelogram, the south part being devoted to bedrooms with a corridor on the north from which project the staircase (with lift) and sanitary apartments.

The publication of Sir Lauder Brunton's description in the *British Medical Journal* evoked some criticism of an adverse nature on many points, the chief of which related to the height of five stories.

In transition to the next group may be placed the Falkenstein Sanatorium,† near Frankfort, erected by the well-known Dr. Dettweiler. It has the high central building with obtuse angled wings, from which on either hand corridors connect with other buildings. The large dining-hall seats 200; winter gardens, and social rooms such as music, reading, and billiard rooms, are included.

Proceeding to the connected pavilion type, we have as an example the East Anglian Sanatorium, at Nayland, in Suffolk; of two stories, the main building slightly converges in the centre, where is an open-air gallery, the patients' rooms being right and left, with a north corridor, but no verandahs. The dining-hall and billiard-room, kitchens and stores, form a north block connected by a central corridor having offices and staff-rooms on either side of it. Under this heading comes Dr. Knopf's plan of an ideal sanatorium, which shows a frontage of three two-story pavilions in line connected by two-story galleries, from each of which a corridor runs north to the dining-hall, winter gardens, and kitchens. Recreation and isolation pavilions are shown.

Of the disconnected pavilion type the London Open-air Sanatorium at Pinewood is a very good example, and has only been in use twelve months. There is a two-story central administrative block with hall, medical rooms, and library with central corridor. East and west of this are the patients' two-story blocks slightly inclining outwards and merely connected by low, open, covered ways. The dining-hall is some 40 ft. north of the central block, and quite detached from it. Behind the dining-hall are the kitchens, &c., with further isolated blocks for laundry, stables, engine and dynamo rooms. A verandah is placed in front of the centre block, and two-storied verandahs at each end of the patients' blocks approached from the corridors only. Crooksbury Sanatorium, in Surrey, is another recent building, having a range of twelve bedrooms on the ground floor, and with nurses' quarters over the centre, the dining-room and kitchen block behind. A little higher up the hill is a two-story building for eight, with verandah and balcony at the end, where it does not interfere with the rooms. The ground floor rooms open on to a wide tile pavement, over which awnings are stretched when found desirable.

Of the isolated or châlet type, the Adirondack Cottage Sanatorium, New York State, has a central executive building surrounded by twenty-two or more different cottages, from 75 ft. to 100 ft. apart; these in many cases consist of four bedrooms, with a sitting-room in a re-entering angle, and a verandah outside. Among other places in England this idea is carried out at Hailey, near Goring, where the patients sleep in single-roomed wooden châlets, constructed with windows on each of the four sides, and a small verandah on the south. The dining-room and administration, as well as some bedrooms, are in the central building. This motive of thorough isolation has been further developed by Dr. Johns, at Parkstone, where the executive block is occupied by offices and officers' quarters only, the dining-hall and kitchens being separate, and excepting the seven-roomed pavilion for ladies the patients occupy double-roomed châlets, widely separated, constructed of wood and iron, with provision for opening three sides, the doors being in a verandah porch. Asphalted paths are the passage ways. This latter system is eminently favourable where the adoption of a proposed site would be more or less experimental. Merely the nucleus of a hospital might be erected, and if proved successful accommodation could be added piecemeal, or altogether removed and placed elsewhere if the contrary happened; and further, after a certain number of years the whole of the building site might be purified by fire. Economy also favours this, but there is the drawback of warming being somewhat difficult.

Passing on to the component parts, of first consideration are the patients' bedrooms, best placed on the south front with only a corridor behind them, and this latter should have a sufficiency of opening windows as well as doors at the ends. A floor space to each room of about 120 to 150 super. ft., and a cubic space of about 1,200 to 1,400, seems a fair allowance, but cubic space is secondary to thorough ventilation, and to ensure this about half of one wall should be window space, and for the ground floor rooms French casements reaching to the floor, with fanlights over, give best results, enabling patients with their beds to pass directly into the open. Several methods have been tried for cross ventilation, including air-ducts through the corridor from the outside of the north wall; the bedroom doors have been made with panels

* A paper by Mr. Harbottle Reed, architect, read at the recent Congress of the Royal Institute of Public Health, Exeter.

† Dr. Knopf.

‡ *B.M.J.*, June 7, 1902.

arranged to admit the air; but a hopper fanlight over the door is, perhaps, as effective as any, if the windows of the corridor are placed opposite each bedroom door; the hopper also shows whether the lights are used unduly. In the châlet system, with windows on three sides and door on the fourth, there is no trouble in this respect.

An open fireplace in each bedroom has been advocated, but it is a question whether the dust it causes does not counterbalance the gain from the cheerful aspect of a fire which is rarely used, and a smoke begrimed ventilating shaft. Radiators appear to present the easiest solution of the warming problem. Then the ordinary precautions observed in hospital construction should be enforced with regard to wall surfaces, rounded angles, abolition of mouldings, impervious floors; the usual plan adopted for the latter seems to be either a floor covering of linoleum or plain polished woodwork, only a damp cloth being used for cleaning.

For plastered wall surfaces paint or duresco is used, as are also varnished papers, and it is here that the weak point of timber buildings shows in the multiplicity of joints; at Nordrach I believe the planks are simply varnished repeatedly. Pegamoid paper and compo board decrease the joints, and when the latter is covered with a varnished canvas the result seems very satisfactory. The condensation on painted walls is said to have no effect on the patients. The Nordrach plan of douches in each bedroom does not seem to be in favour in this country; where separate rooms for douches and baths are provided, water closets or earth closets are placed in ventilated blocks. Outside sun blinds are sometimes used, and elsewhere draw-curtains of materials which permit of perfect cleansing. The dining-room must have ample windows, on at least two sides and where possible three, and if placed away to the north of the main block it will get considerable sunshine. Electric fans are useful in very large rooms. In connexion with the dining-room there should be adequate kitchens with stores and offices, and nurses' rooms; a milk steriliser is a requisite. A laboratory is necessary for bacteriological purposes, as well as the usual rooms for the medical officer, which should be placed slightly apart from those used by patients. Where inhalation forms part of the regime a room should be provided for it.

Means of isolating and nursing grave cases are sometimes desirable, as is a mortuary. The laundry block should include a disinfector and a destructor, wherein paper handkerchiefs, spitcup linings, &c., may be burnt. The engine and dynamo rooms should be kept some distance away, and if an oil-engine is used care must be taken with the exhaust. For lighting purposes electricity is used where possible. Warming by low pressure steam or hot water is generally adopted, with the addition of open fires in some of the common rooms. In some instances (*vide* Dr. Walters) a medicated solution of creosote, turpentine, and eucalyptol is vaporised with the warm air apparatus.

Reverting to the question of verandahs, which are useful if properly placed, their value is decreased if fixed in front of patients' rooms and covered with an opaque roof, or balcony floor, since the access of air and sunlight to the room is bound to suffer in this country. A perfect continental model may not be at all suited to our less sunny climate; indeed, several of our English sanatoria dispense with large verandahs. Some authorities recommend them with a depth of 12 ft., and means of warming. An open fireplace has even been tried, but, as may be surmised, unsuccessfully. More essential than that the verandah should be warmed is that it should be properly ventilated, since patients can be so wrapped in warm clothing and provided with hot bottles as to be able to lie out of doors in a snowstorm. A wide paved floor immediately in front of the patients' rooms is most desirable, and over this movable awnings may be placed when demanded by the weather, as at Crooksbury. A second method is to have open-air galleries (as at Nayland) between the blocks, or at the end of the blocks as at Ruppertshain and at Pinewood, where the verandah has a first floor and is provided with weather screens; care should be observed that doors or windows permit of beds being wheeled on the verandahs or balconies. At Overton, Bournemouth, the screens are also movable. It has been found in many instances that the shelters in the woods are preferred to the verandah; in warm weather this is generally the case. At Nordrach "the grounds are provided with seats at intervals, but with only three small huts or shelters, and no regular liegehallen or covered walks; Dr. Walther believes that when rest is needed, it is best taken in the patients' own bedrooms." (Walters.)

English sanatoria usually have a number of liegehallen or sleeping châlets raised above the ground, some of the revolving pattern, others with sides that can be opened or closed, according to the weather, and when shelter is required much of the patients' time is spent in them, being thus practically in the open. They are generally in electric communication with the centre block, and provided with lights. At Kidmore they are double, with a glass roof for winter and shelter for summer. To gain the fullest advantage of sunshine other devices are sometimes employed, such as high-walled gardens where air baths may be taken, and sun baths in places specially arranged to concentrate the sun's rays upon the patients. Seeing that the source of infection is the sputum, provision must be made for its reception and destruction. Frequent disinfection of the rooms is also recommended.

Furniture is another point on which much care is exercised to keep as plain and free from dust quirks as possible; wardrobes have sloping tops, and chests of drawers are blocked up from the floor so that they may be swept under; while beds are sometimes raised (at Kidmore) to the window level. Each bedroom should have bell communication with the doctor, matron, and chambermaid, and a ceiling and table light.

The limit of accommodation is a debatable point to be settled by medical authorities, some of whom favour a maximum of forty patients, with a separate bedroom to each person. The palatial German institution* of Falkenstein takes 150, Hohenhonnef and Ruppertshain 100 each. Sultzhayn (Hartz Mountains) 120. Dr. Walters states that Hohenhonnef "cost nearly 72,000*l.*, or about 600*l.* per bed without reckoning the ground," while one of our recently erected sanatoria for twenty beds cost about 325*l.* per bed, and an additional block for eight beds would only cost 150*l.* per bed. Timber buildings, covered with corrugated iron upon a brick or stone foundation, would be considerably less expensive.

In conclusion, I should like to express my indebtedness to the many English medical officers who have courteously afforded me a view of their sanatoria; time did not permit me to inspect those on the Continent.

* Dr. Knopf.

Illustrations.

THE PIAZZA, VENICE, BEFORE THE FALL OF THE CAMPANILE.

WHETHER the Campanile is rebuilt in its old form or not, it may be of interest to our readers to preserve a memorial of its appearance before the catastrophe, and we accordingly give a large photograph of the well-known site, taken from a point of view from which it has not often been illustrated, and which gives special prominence to the Campanile in relation to the surrounding buildings.

We are indebted to Mr. E. A. Gruning for the suggestion, and for the loan of the photograph, which was in his possession.

HILL END, WENDOVER.

THIS house had to stand in a belt of trees with views to the east, north, and west, but none whatever to the south hence the general arrangement of plan. The ground pitched away quickly to the west, and this suggested the terrace shown. The materials to be used are brick covered with roughcast for the walls, with cement dressings in places, and the roof covering shown is stone slating. Mr. Leonard Stokes, of Westminster, is the architect, and the drawing reproduced was exhibited in this year's Royal Academy.

DECORATIVE PANELS, BROADLANDS, ASCOT.

THESE paintings, which decorate the panels in a coved ceiling over the fireplace in the hall at Broadlands, Ascot, represent ships of the time of James I., and heraldic devices. They are designed and executed by Mr. H. C. Brewer.

The work is slightly relieved in gesso, and painted in heraldic colouring and lacquered metals.

The drawing, which was exhibited at the Royal Academy in 1901, shows two of the panels.

THE HOUSING OF THE WORKING CLASSES.

THE following paper was read by Mr. H. Tozer, Vice-Chairman of the Housing Committee, Westminster City Council, at the recent congress, at Exeter, of the Royal Institute of Public Health. After some preliminary observations the author says:—

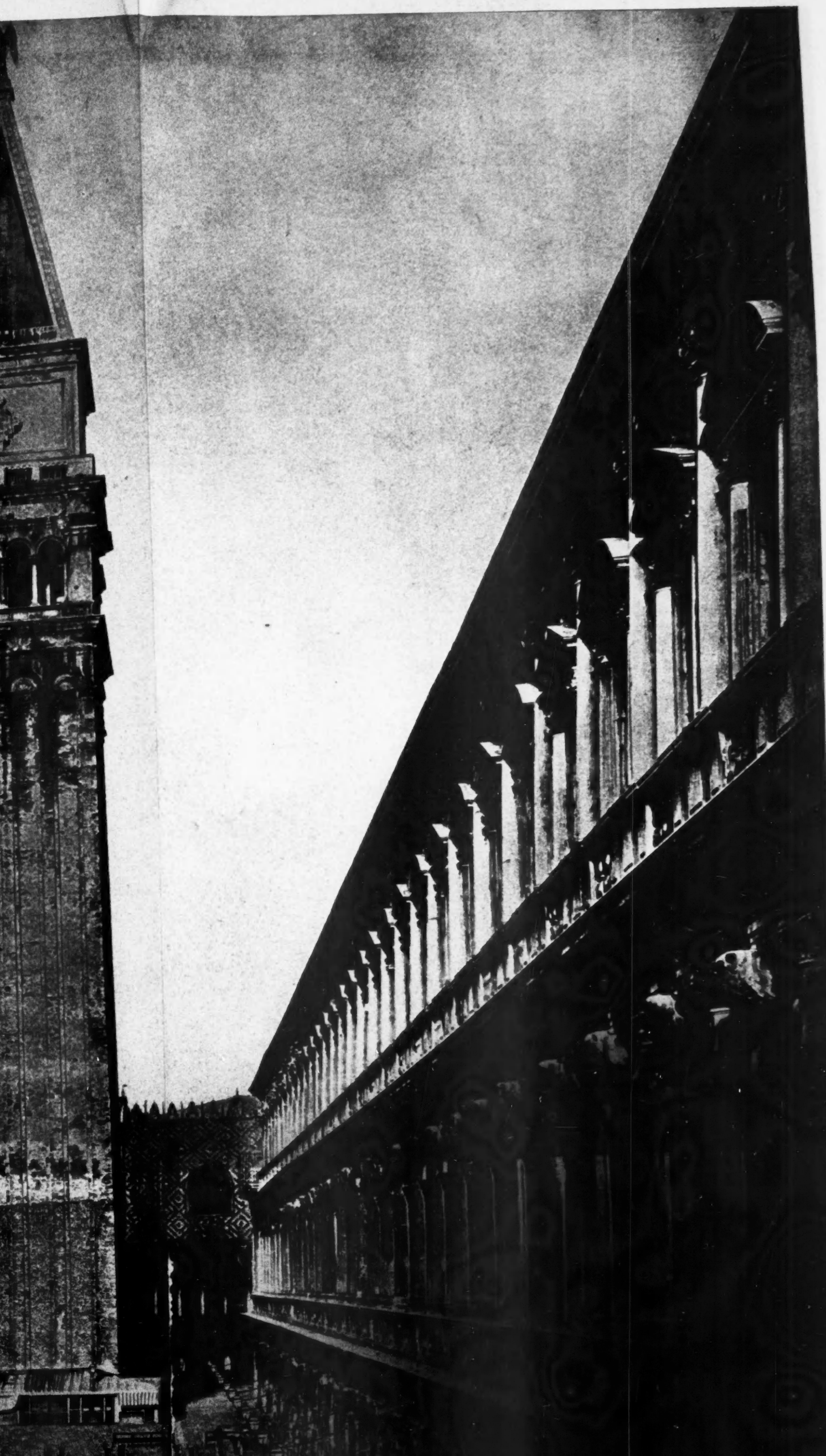
The academic question is often raised as to how far municipalities should take upon themselves what may seem to be the duty of traders, and the definite expression of a principle has often been invited. Is not this the right axiom, that municipal trading is justified, and is advisable where such things as are vitally necessary to the health and well-being of a community are inadequately provided by private enterprise, whether it be water, public lighting, tramways and other locomotion, housing of the poor, or other things?

As long ago as I can remember taking an interest in public questions, the housing problem existed here in Devonshire in regard to the agricultural labourer, and many of you may recollect the acute controversy of some forty years ago, led by Canon Girdlestone, which had no very satisfactory result. The question was practically solved in the course of time by the labourer leaving the land to a great extent, and this may be said to have been one of the principal causes why agriculture became in England a gradually declining industry. As true to-day as it was then is the saying that—"You cannot expect men to act like Christians when they herd like pigs."

Our cities and towns have so long attracted streams of labour from rural districts that proper housing of the working classes has fallen below its requirements, even from the health point of view only. So that in many large centres of population we are to-day face to face with the difficulties of this housing question. Our commercial supremacy, which depends in a great manner upon our raw labour, is seriously threatened, and it behoves us, *inter alia*, to "wake up" to the necessity of labour being properly sheltered. Our factories and workshops have been vastly improved, labour has in many respects been beneficially organised; but it must be admitted that generally the homes of the working classes do not come up to the modern standard of comfort and health. This must prejudicially affect the physique of the labourer, and deteriorate the quality of his labour; besides which overcrowding is admittedly one of the main causes of intemperance. In every city there is a natural tendency for workmen to concentrate as near their labour as possible, and the demand for decent homes being in excess of the supply, the rents become abnormally high, and, as a partial consequence, land becomes prohibitive in value for the purpose of erecting workmen's dwellings.

This concentration can only be obviated by what is now universally recognised as the first important step in dealing with overcrowding—cheap transit to outer parts of towns, so inducing large numbers of the working classes to go further afield and relieving the congestion in the populous centres of the towns. A cheap and efficient system of locomotion offers, as has been well said, the most immediate and least experimental, though not complete, solution of the housing problem. Build only where you can make the dwellings self-supporting, for philanthropy should not be an essential part of any scheme. Unless you can buy your land cheaply, you will defeat the success of your scheme. But where insanitary or undesirable sites are cleared at the expense of a municipality, and the land used for erection of dwellings, only the value of the land for such purpose should be charged against the housing scheme, and any excess of cost should be considered as civic improvements, and charged to an improvement fund. Still, this method should only be sparingly and conscientiously—certainly not invariably—adopted.

How to acquire land at a price that will



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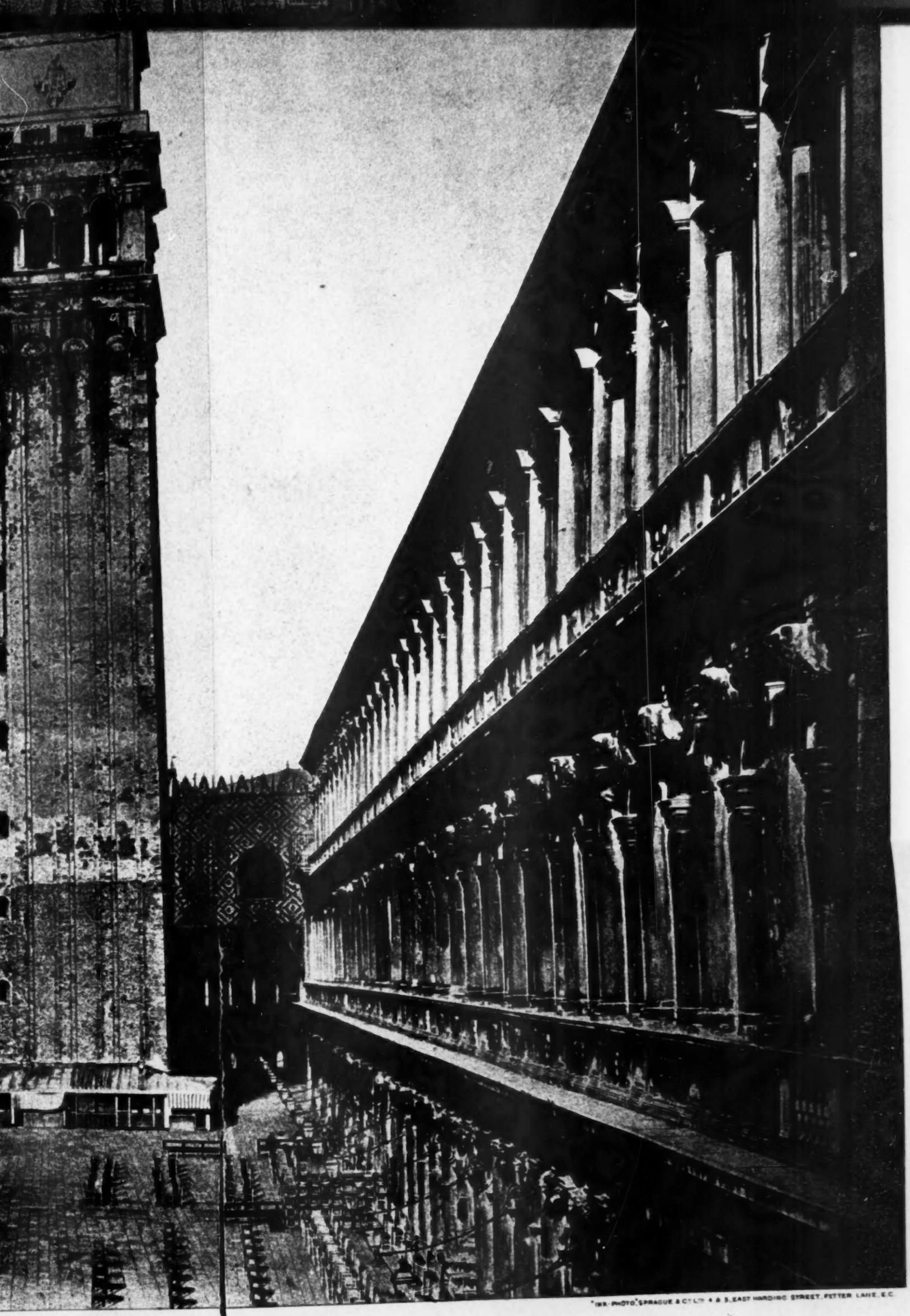

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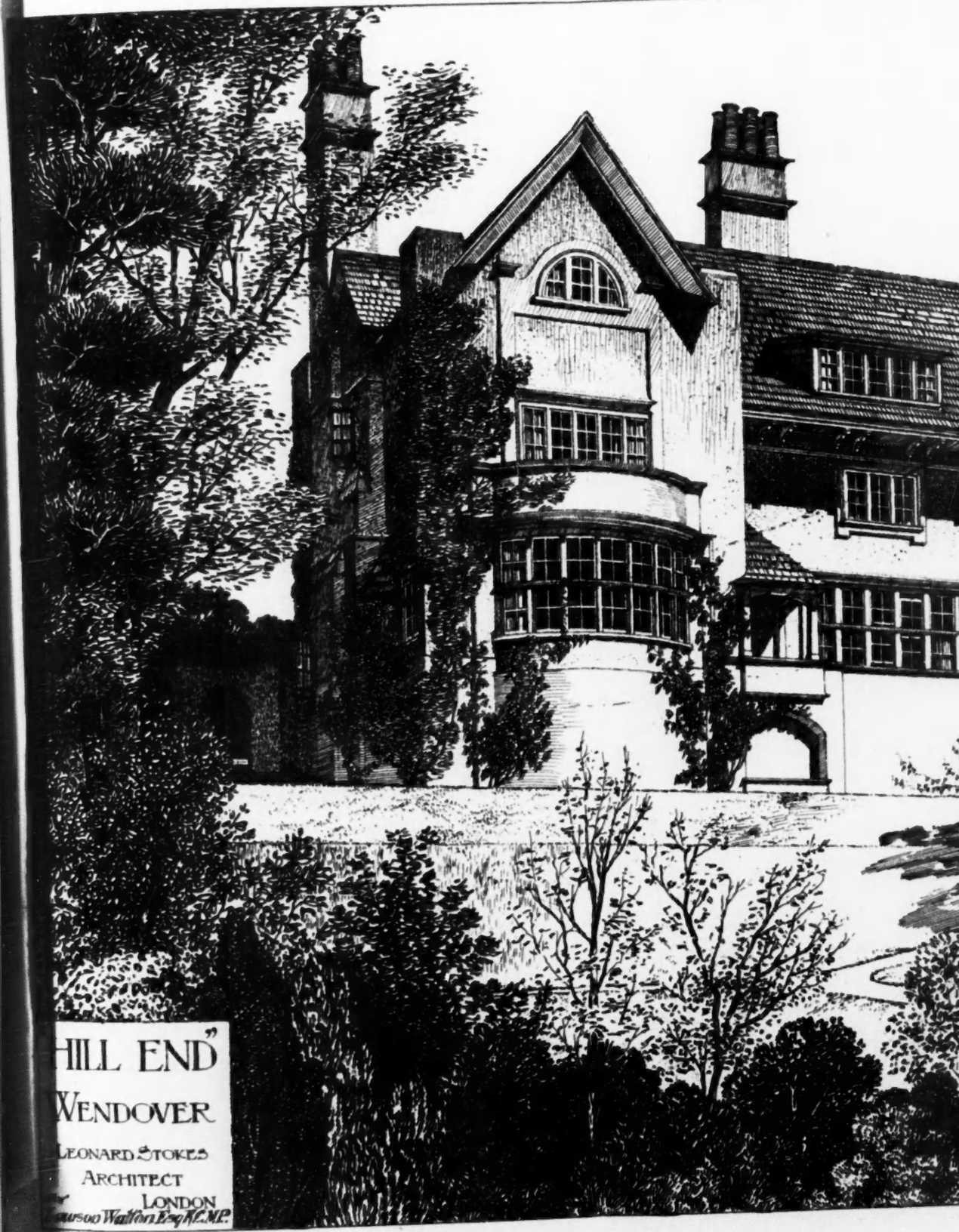
THE CAMPANILE.



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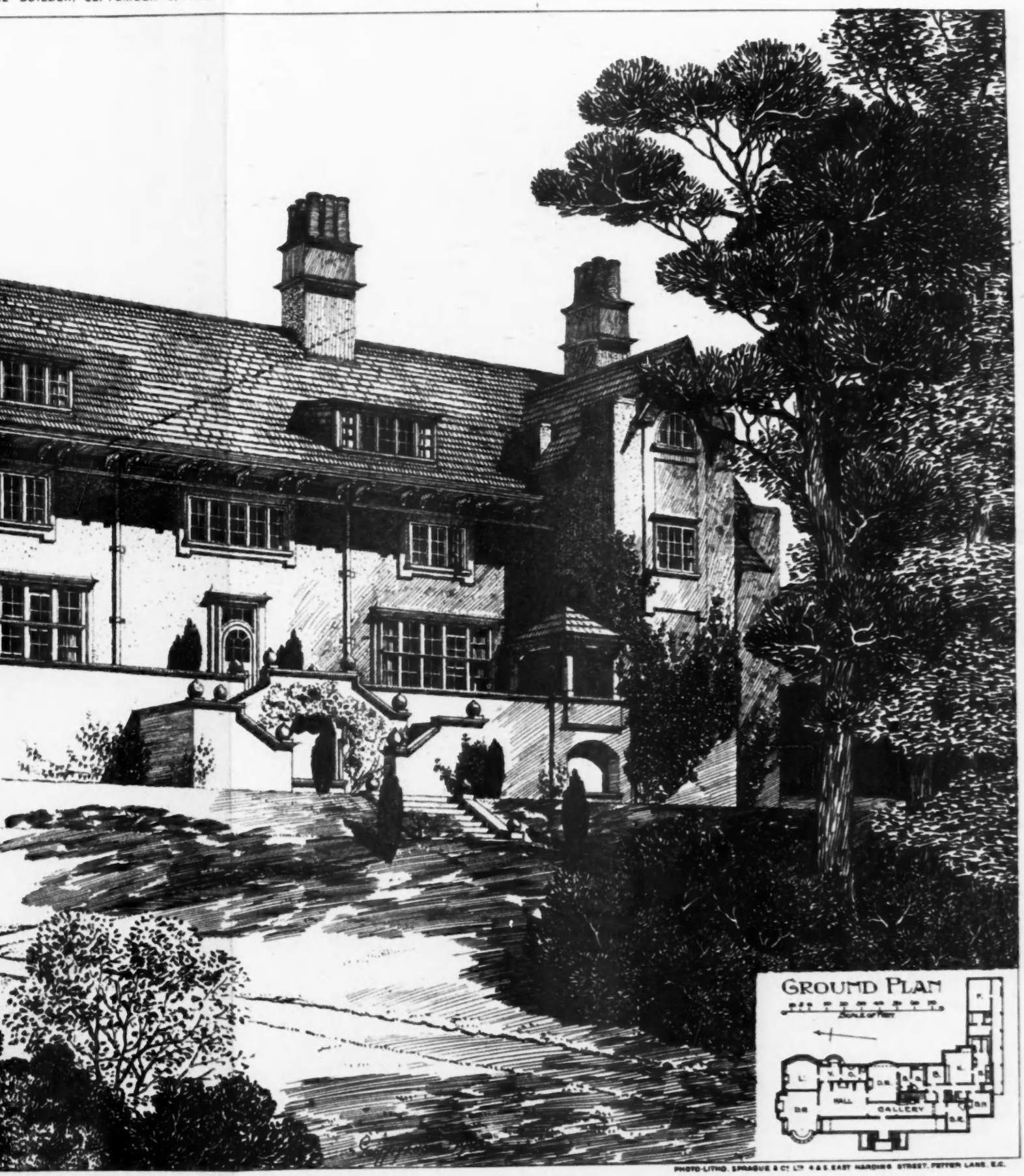

PHOTO-LITHO. SPRAGUE & Co. LTD. 4 & 5 EAST HARDING STREET, FETTER LANE, E.C.

DECORATIVE PANELS AT "BROADLANDS," ASCOT.—Designed by Mr. H. C. Brewer.

enable you to provide attractive homes at fair rents is a matter that must be dealt with according to individual circumstances. But, as some guidance, I may mention what the City of Westminster Council (of which I am a member) has recently done. They went to the Ecclesiastical Commissioners, who possessed a large site in Westminster, and said—"Will you help us to deal with the housing difficulty by selling us the land at so much a foot?"—some 40 per cent. below its value for commercial purposes, but still a fair price; and be it said to the credit of the Ecclesiastical Commissioners (who are not, as you are aware, constituted for the dispensation of charity), they consented, subject, of course, to fair conditions. What was done in this instance can be done in other cases, although perhaps in a different way according to circumstances.

And now, as to some details of the various workmen's dwellings that have been erected in late years, which may be summarised in three classes, viz., lodging houses, block buildings, cottages, the first of which I do not propose in the short time at my disposal dealing with, for they are only erected in thickly populated towns, where there is a large class of unmarried labourers, earning scanty and irregular wages. The Rowton House System seems to form the most complete measure of provision for this class, and has met with great success.

Block dwellings are built in towns or urban districts where the high value of land does not permit of cottages being erected, so as to produce a reasonable rate of interest on the outlay at the low rents which the average working man can afford to pay. They are usually built from three to six stories in height, according to the locality and cost of land. There are two varieties of tenements in block buildings—namely, "self-contained" and "associated." A self-contained tenement is one which has a water-closet and scullery or laundry of its own. An associated tenement has the use of a water-closet and laundry in common with one or more tenements, and a so the use of a sink for drawing water when the laundry is occupied. Associated tenements are only built by bodies such as the Guinness Trust, the Peabody Trust, and those Municipal Corporations who desire to house the lowest-paid class of wage earners. It is to be regretted that all Corporations do not hold the view that the poorest have the first claim on their attention. It is possible to let an associated tenement at 1s. to 1s. 6d. less rent than can be charged for a self-contained tenement.

Tenements may consist of a single room; a living-room and one bedroom; a living-room and two bedrooms; and occasionally a living-room with three or four bedrooms, with the water-closet and laundry accommodation just mentioned in addition. The proportion of each kind of tenement naturally varies with the locality and the class and means of the persons to be housed. The tenements of all block dwellings are entered from a common staircase, or from an outside balcony. The latter is an objectionable feature, as it becomes necessary to pass a neighbour's windows before arriving at one's own entrance. The more tenements that are grouped round one staircase, the cheaper is the building to construct. The smallest number of tenements on each floor entered from one staircase that I have seen is two and the largest number is seven.

It will probably be of interest if I describe a tenement in detail, avoiding as far as possible technical language. The living room should be provided with a food cupboard, divided into two parts; the upper part, being for the storage of food, should be properly ventilated. The lower part can be utilised for storage of household utensils, but in the case of an associated tenement (where there is no scullery), a portion of the lower part should be reserved for coals. A dresser or rows of shelves with cup-hooks thereon should also be provided. The range now generally in use, though varying slightly in design, is of the kind known as a self-setting close range. This is a great preventive of smoky chimneys, as there can be no down-draught. Either an iron or a wooden mantel surrounds the range.

In planning the living-room care should be taken to provide a space for a bed in case of emergency, and the doors into the bedrooms should be so arranged as to afford proper ventilation of those rooms without destroying the comfort or utility of the living-room. Each bedroom should have a register stove, which, although only used in cases of illness, affords an efficient means of ventilation at those times when no fire is needed. A dress cupboard or a row of clothes pegs is usually supplied in every bedroom. The former is far preferable, as the clothes are kept clean, and the room presents a tidier appearance. The laundry or scullery of a self-contained tenement should contain a washing-trough, an independent copper in which to boil clothes, a coal bunk, and, if possible, a small gas cooking range. The latter is a great convenience, as it enables a tenant to cook during the summer without lighting a fire in the living-room. Lines on which to dry the washing should also be provided in each laundry. The laundry of an associated tenement should be fitted with a washing trough, a rinsing trough, and a copper and drying lines, but no cooking stoves. It is generally arranged that each tenant has the sole use of this laundry for at least one day a week, and may lock it up to prevent theft of clothes while drying. If the other tenants require water they obtain it from the sink on the landing previously referred to. The water-closet does not require any description beyond stating that it should be entered either from an open balcony, or from the staircase landing.

Cottage dwellings may be roughly divided into two classes:—(1) Cottages containing one tenement only, to be occupied by one family; (2) cottages containing two or more tenements. The first-class are usually two stories high, and the accommodation provided consists of a living-room, kitchen, scullery, water-closet, and three or more bedrooms, and a small garden at the rear. The second class may be either two or three stories high, containing one tenement or flat on each floor. The accommodation in this type of cottage is similar to that supplied in block dwellings, viz.:—a living-room, scullery, water-closet, and one or more bedrooms, but there is no doubt that the greater privacy obtained by having a separate access to each tenement, and the absence of many flights of stairs, renders cottage dwellings more attractive than block buildings. Another attractive feature is the provision of a garden for each tenant. I must, however, again remind you that it is absolutely impossible to provide this type of dwelling in commercial centres owing to the great cost of land. The fittings in cottages are of the same design as those described for block buildings.

It will be interesting to give a few particulars of the average areas of rooms adopted in London by some of the bodies engaged in housing the working classes, and the rents charged by them. I have only included two-room and three-room tenements as they form the best basis for comparison, the greatest number of tenements erected having been of these two types.

—	London County Council.		Guinness Trust.		Four per Cent. Industrial Dwellings Company.		Westminster Council.	
Two Room Tenements.	Area.	Rent.	Area.	Rent.	Area.	Rent.	Area.	Rent.
Living Room	153 ft.	7s. 6d.	141 ft.	4s. to 5s. 6d.	176 ft.	5s. 9d. to 7s. 6d.	154 ft.	6s. 6d. to 7s. 6d.
Bedroom	105 ft.		127 ft.		130 ft.		117 ft.	
Total	258 ft.		268 ft.		306 ft.		271 ft.	
Three Room Tenements.								
Living Room	157 ft.	10s. 6d.	155 ft.	5s. 3d. to 6s. 3d.	176 ft.	7s. to 9s.	154 ft.	8s. 6d. to 9s. 6d.
Bedroom	96 ft.		101 ft.		105 ft.		98 ft.	
Second Bedroom	124 ft.		101 ft.		105 ft.		126 ft.	
Total	377 ft.		357 ft.		386 ft.		378 ft.	

It may be stated that if the rents exceed 2s. 6d. a room for an associated tenement and 3s. 6d. a room for a self-contained tenement, the scheme is likely to be a failure from the point of view of housing the poorer portion of the working classes. The average rent per room charged by the Guinness Trustees is 2s. 1½d., and included in this low rent is the free use of baths, clubroom, Venetian blinds, chimney-sweeping, and boiling water obtained from a specially-constructed urn-house. For a nominal charge a tenant can have the whole of his washing dried in a special heating chamber or drying-room. To ensure that none but the poorest wage earners benefit by the Guinness Trust, no tenant is accepted who earns more than 25s. per week. Of course, in certain districts where the value of land is abnormally high, such as in the City of Westminster, it is impossible to let rooms at less than 3s. to 3s. 6d. each, even on the associated principle, but it must be borne in mind that the occupants of the new buildings—chiefly artisans in a position to pay such rent—would have vacated other premises which would soon become let to their less fortunate brethren.

I will now give you some of the most important considerations in deciding upon the suitability, both from a financial and sanitary point of view, of any site or area for housing purposes, and which will enable you to form a judgement of the merits of any plans for covering the land which may be laid before you.

The cost of land in urban districts should not exceed 20*l.* for each room which can be placed thereon, and this amount is subject to my remarks hereafter under the heading of subsoil.

In suburban districts where cottages are intended, the cost of land should not exceed 1,800*l.* per acre. No site for block dwellings should be less than ¼ acre, and if possible, 1½ to 2 acres, the cost of maintenance and superintendence not increasing in ratio to the extent of the area of the site. A square piece of land is most desirable, without awkward angles which cannot be developed. It enables the architect to design the buildings square—a great factor in saving expense and a great factor in economical planning. The land should have frontages to as many streets as possible to avoid the waste of land involved by forming new roadways on the site.

The next important element to be considered is the subsoil. The most advantageous site on which to build is one with a good bed of gravel near the surface. This not only saves the cost of excavating to a great depth and putting in deep foundations, but, in addition, the gravel obtained from the excavations can be sold and will pay part of the cost of the foundations. If there is a bad subsoil, which is often the case, and it becomes necessary to excavate to a great depth before a sound bottom is reached, then a half-basement should be built—*i.e.*, the lowest story should be sunk 4 ft. or 5 ft. below the surface of the ground, so that the expense of excavation is not incurred in vain. Before purchasing a site a series of trial holes should be dug, so as to ascertain the exact nature of the subsoil.

Block dwellings are rarely built less than four or more than six stories. The most usual number of floors is five without or six with a half-basement. The greater the number of stories the more economical is the building, as the cost of the land, foundations, paving, drainage, and roof would be a constant factor, and would be spread over a larger number of rooms in a five-story building than in a four-story building. Cottages are never built more than three floors high—lower ground, ground, and first floors—the cost of land being comparatively small where such dwellings are erected. The buildings, wherever practicable, should face east and west, so that every habitable room may obtain a share of sunlight every day.

The buildings should be very substantially constructed to avoid constant renewals and repairs. All pipes, except supply pipes, should be exposed, though not unduly, and easily

accessible, and soil and waste pipes should be provided with sweeping holes. Staircases, corridors, and water-closets should have high tiled dados to save frequent cleaning. Internal gutters should be avoided, as they get stopped up by snow and dirt, and strong eaves gutters substituted. Access to the roof therefrom can be easily and safely gained to execute any needful repairs without the expense of scaffolding. All architectural effect should be obtained by picturesque sky-line, and by means of great variety in the treatment of the windows. Projections should be avoided, owing to the extra cost involved, except where the plan necessitates them. Block dwellings should be fireproof throughout, and the floors of all laundries, water-closets, landings, and corridors covered with some hard, imperishable material. Ample provision should be made in the design for sufficient space between long blocks of dwellings to give light and air and to form playgrounds, but it is very important that there should be due and proper relation of such spaces to the overlooking rooms, so as not (as is sometimes the case) to sacrifice the dimensions of the rooms to the size of the outside spaces, and vice versâ.

Great care must be exercised in the management of all housing schemes both during and after completion, so as to ensure economical working. A great saving in the initial cost of construction may be effected by entering into separate contracts with each specialist employed in the erection of the buildings, instead of entering into one contract with a builder for the whole job, including work which he never executes, but upon which he expects a profit. The following may be considered specialist's work :—(*a*) Foundations. (*b*) Sanitary goods. (*c*) Iron ranges, mantel registers, coppers, railings. (*d*) Fire-proof floors. (*e*) Paving. (*f*) Artificial stone and plastering. When the buildings are completed, an efficient superintendent and one or more porters (handy men) according to the size of the undertaking, should be appointed. The superintendent's duty ought to be to generally supervise the dwellings, to collect the rent, and pay the money into a local bank, and to control the work of the porters. The porters' duties should consist of keeping the buildings in order and whitewashing and colouring the tenements before reletting to a new tenant, and doing any small repairs found necessary. If these methods be adopted, the outgoings will be considerably less than if a staff of clerks is employed at a central office to collect the rents, keep the accounts of money received from each tenant, and to issue instructions to a builder on every occasion that some trifling repairs are needed. The internal and external painting and any important repairs should be done periodically at fixed intervals, and a certain sum ought to be set aside annually to meet this expenditure. The only items amongst the outgoings which it is impossible to control or reduce are rates and taxes, which unfortunately have risen so much in most districts of late years as to materially affect rents, but it is not unusual for the landlords to pay the taxes at a compounding allowance of 10 to 15 per cent.

The last item remaining to be considered in all housing schemes is the sinking fund. The annual amount required to be set aside to repay the cost of land and buildings varies according to the number of years over which the repayment is spread. The Treasury have decreed that public bodies raising money for housing purposes shall repay the loan in sixty years. There is, however, every prospect that this period will shortly be extended to eighty years, at any rate for the value of the land. This will make a very material difference to the amount to be reserved annually as sinking fund, and in some cases reduce the weekly rent as much as 3d. per room.

Private bodies erecting dwellings need not hesitate to extend the period to 100 years, as the buildings, if properly constructed, will not only last considerably longer than that time, but will be a valuable asset for many years after the loan has been repaid. It also appears to be unnecessary to provide more than a very moderate sinking fund on the land, which cannot, of course, disappear, nor decrease in value to any marked amount. It is much more likely to increase than decrease in value in any of the thickly-populated districts where housing schemes are required.

A small sum should be set aside annually and allowed to accumulate, to meet any large items of unforeseen expenditure which might possibly occur, such as sanitary improvements, replacing worn-out or defective ranges or coppers throughout the buildings.

It has been clearly demonstrated by experience in London and elsewhere that it is possible to house the working classes at low rents and yet obtain a fair and remunerative rate of interest on the capital employed. It should, however, be borne in mind that, notwithstanding the efforts hitherto of private individuals, public companies, philanthropic trusts, and public authorities, practically no great headway has been made in dealing with this pressing problem, for all the schemes completed or in hand have not been sufficient to keep pace with the natural growth of the working class population of our great towns. It therefore seems an almost overwhelming and hopeless task, even with public and private enterprise combined to provide decent homes for the whole of the huge army of workers whose members are constantly increasing, unless there be further legislation making it, amongst other things, compulsory, when a site of certain size is cleared for any purpose whatever, for the owner to rehouse all persons of the working class displaced by such clearance.

Since this paper was written the Joint Select Committee appointed to consider the present Standing Orders has recommended that in London *every case* in which workmen's houses are taken should be notified to the Central Authority, whilst outside London the attention of the Central Authority should be called to all cases where thirty persons of the labouring class are displaced. The fixing of rents for new workmen's dwellings in London by the Central Authority is also recommended.

TRADES UNION CONGRESS.

THE members of the Trades Union Congress are meeting this year in London, and on Monday the delegates met in the Holborn Town Hall.

The President, Mr. W. C. Steadman, L.C.C., in welcoming the Congress to London, said that much had been done to establish civic life in London, and they had now twenty-eight Borough Councils and the greatest municipality of all, the London County Council.

Sir John M'Dougall, Chairman of the County Council, said he was there with great pleasure to give them a hearty welcome to the Metropolis. The County Council was accused of raising wages, but that they could not agree to. They had, however, recognised the trades rates of pay, and their lead had been followed by the Government and other large employers. He believed that was a great principle. The Council had also taken the step of employing direct labour, instead of giving everything to the contractor. He believed that the Council, in setting up a Works Department, had done a most valuable thing in the public interest. He suggested that the time was coming when the Trades Congresses would say to a working man employed by a public body that he must put in his best work and a good quantity of it.

Mr. Gregory (President of the London Trades Council) also welcomed the delegates.

Mr. John Burns, M.P., said that, on behalf of five millions of people, Sir John M'Dougall had welcomed them to London. The presence of Sir John marked a change in the Metropolis since their last Congress there. It marked a civic revival sympathetic to labour, and not unanalogous to the time when the London merchant and apprentice upheld the liberties of the community. He hoped that again the best craftsman would be the greatest man. He urged on them tolerant work in the whole community by co-operation with the most sympathetic elements, to influence both municipalities and Parliament in ameliorating the condition of the poor. He warned them that they met at a serious time. Trade was in a declining stage; wages were beginning to fall; and the Press was more against them than ever before; Parliament was unsympathetic, and the law had hit them heavily, challenging their right of organisation and their privilege to persuade, and public opinion was in many quarters setting against them. Their duty was to head off the stream setting in against them. Their grievances were their reason, and the misery around them their justification.

Mr. Bowerman was called on to move a vote of thanks to Sir John M'Dougall, which was heartily accorded.

The Parliamentary Committee's Report was presented. The Report dealt with the decision of the Lords in connexion with the Taff Vale dispute, the conference on old-age pensions, the Corn-tax Conference, the Education Bill Conference, deputations to Ministers, and other parts of their work for the year. An interesting portion was that furnished by the Committee which visited America. Messrs. Tillet and Chandler state that, after a short stay in New York, they journeyed to Washington, and were much impressed with the work of the Federation head offices. The extremely satisfactory progress of the Federation in financial and numerical strength was evidence of growing interest in Trade Unionism, and a concurrent increase in wages for American workmen. The increase in revenue for the Federation for the last year was 25 per cent. above the income for the previous twelve months. The membership of the Federation had increased by an addition of 364,410 names, which, together with a large augmentation of numbers in Unions unaffiliated with the Federation, brought the numerical increase of adherents to Trade Union principles to more than half-a-million for one year. This fact, they consider, should be utilised in all British Trade Union reports, in refutation of the statement made by interested persons "that Trade Unionism is not an industrial factor in America," together with statements "that American industrial prosperity is due to the absence of Trade Unionism." Nine hundred and sixteen charters of affiliation were issued to labour bodies for the one year, while for newly-formed unions 4,056 affiliations were accepted. The results were due to the energetic and devoted services of the officials of the Federation, many of whom learned their Trade Union principles in this country. Delegates representing unions from San Francisco to the extreme Eastern States attended at the Convention at Scranton to the number of 309. The American and Canadian Unions represented more than a million membership. For the more efficient organisation of the Federation thirty-five paid organisers were employed and 800 volunteer organisers spread over the whole area of Federation activity. The vast extent of ground covered by Union operations runs into many thousands of miles, even were a straight line drawn from east to west of the States. They were pleased to find a close alliance between the Canadian Unions and the American. A pleasant feature of the relationship between the British Unions and American was indicated by the evident desire of the delegates at the Convention to prevent friction between branches of British Unions long established in America and the new Unions which have grown under the American Federation. An attempt was made to set up a line of demarcation—an attempt very readily tabooed by the delegates present. Fraternal greetings were exchanged, the spirit manifested indicating a strong desire that English-speaking races should make common cause in the economic struggle of the future, it being considered the internationalising of capital called for internationalising of labour organisations. The delegation were of opinion that American Trade Unionism would outstrip British Trade Unionism in influence and numbers. The reports to the Convention indicated the adoption in several States of the eight-hour day. The delegation made inquiries as to conditions of labour, and found a very serious condition of things in those centres where Trade Unionism was weak. With some exceptions they found the utmost consideration shown workmen by the employers — ventilation, warmth, splendidly equipped factories, systematic organisation in all departments, and processes of labour much superior to those in existence at home. Cheaper and more rapid facilities of transport, together with superb natural advantages in mineral wealth, made America a formidable world competitor with us. The trusts had not until now made any bad use of their combination, wages having a tendency to increase. One thousand and fifty-six strikes were reported to the Federation, involving 171,223 members, 153,505 of whom received substantial benefit. They were pleased to see an approach being made to conciliation and arbitration in most of the States. Most of the important daily newspapers had a labour column, maintaining a lively interest in labour matters. The class loyalty observed by the Union label they felt could be imitated with advantage in this country.

The Congress met again on Tuesday for the

first business sitting, when Mr. Steadman, the President, delivered his address. In the course of his remarks he said the Housing Question was now more acute than ever. Municipalities were put to a disadvantage in putting Part 3 of the 1890 Act into operation, in consequence of the heavy price they had in most cases to pay for land. The problem would never be solved until they had a Parliament prepared to deal in a drastic manner with the Land Question. It increased in value through the industry of the people and not through the merit of the landlord, yet the more they increased its value through industry, the more he made them pay for it. Land should be taxed on its full commercial value; this would have the effect of bringing into the market surplus land suitable for building purposes at a cheap rate. Slum owners should be punished for charging rents for unhealthy dwellings. Excessive rents affected the people's pockets; insanitary conditions and overcrowding affected their health and shortened their lives. Was Trade Unionism destructive of British industry? He ventured to think not; if it were they would naturally expect to find that in those trades or industries where Unionism was particularly powerful the strongest sypmtoms of decay, and the reverse in those trades and industries where Unionism was but a feeble force. Thus shipbuilding should be in a state of decay, engineering and the building trades much the same, because of the strong Unions in those industries; but, as a matter of fact, those trades had rarely enjoyed a decade of more general prosperity than they had done during the one just passed. Could the same be said of the agricultural industry? Trade Union influence in that sphere had been practically nil. A curious point to be noted was that whilst Germany was pointed out as being one of our greatest rivals, Trade-Unionism in that country had increased tremendously. Denmark was, perhaps, the most prosperous country of all, judged by the standard of comfort obtained by the people, yet that was the country above all others (England not excepted) that stood out as being the best organised from a Trade-Union point of view in the whole world. Even were it true that Trade Unionism was destructive of British commercial supremacy, they might lay the flattering unction to their souls that the causes that brought about the danger was at work with our rivals, only more so. The legal status of Trade Unions had engaged the serious attention of a Parliamentary Committee for the past twelve months. An employer had the right to entice men away from the Union; they should have the same right to entice men away from the employer. Where they were now no one precisely knew, and while the law remained in its present condition, during the time of a strike—so far from their Unions being in a position of privilege—they were likely to be sued by the employers, and have heavy damages awarded against them. Modern industrial society was based upon freedom, and it was a serious matter for their organisations that this should be now challenged by the Law Courts, as it had been in certain recent judgments. They must build up a great Labour Party in Parliament from the ranks of the Trade Unionists, and he was glad to find so many societies moving in this direction. If Labour was to make its own terms with Capital, it could only be accomplished by the strength of the workers. Combination was the strongest weapon they could use to enforce their just demands, and with this object in view he trusted they would march together, looking neither to the right nor left, but with a firm conviction in the righteousness of their cause on behalf of truth, justice, and humanity.

A vote of thanks having been accorded to the President for his address,

The Congress proceeded to consider the Parliamentary Committee's report.

Mr. Hayday moved that "This Congress declares that the time has arrived when the hours of labour should be limited to eight per day in all trades and occupations in the United Kingdom, and this be made a test question at Parliamentary and all local elections, and instructs the Parliamentary Committee to introduce a Bill into the House of Commons with a view of getting the eight-hour day to become the law of the country." He contended that the shorter hours were to the advantage both of the employer and employed, and he quoted the case of the Thames Ironworks.

A prolonged discussion followed, which was closured by the members, and the resolution was carried by a large majority.

The Congress resumed on Wednesday morning at the Holborn Town Hall, Mr. W. C. Steadman presiding.

Mr. F. Hall (Card and Blowing-room Operatives, Oldham) moved the following resolution, which was carried after discussion:—"That the Parliamentary Committee, with the assistance of the Trade Unions represented at this Congress, press upon the Government the great need for an amended Compensation Act, which will provide for all injuries, extended to all trades and employments, no matter where such accidents occur. Compensation to be paid from first day of injury, such compensation to be calculated from the average wages earned by the workmen, and that the Parliamentary Committee be instructed in any action they may take to have regard to all the resolutions and amendments sent in by the various Societies, and appearing on the agenda of this Congress."

Mr. W. Stevenson (United Builders' Labourers' Union) moved, and Mr. J. Emerson (Carpenters and Joiners) seconded, and it was resolved:—"That this Congress considers it imperative in the interest of the building trades that inspectors should be appointed for the proper inspection of plant and machinery in constructional work in buildings in the course of erection or demolition, as such inspections, from a constructional point of view, would be a safeguard to the public as well as protection to life and limb of the operatives; and regrets that the Government, through the Home Office, has not seen the expediency of making these necessary appointments, or of giving the present Factory Inspectors the powers for greater supervision."

The Congress then adjourned.

The Student's Column.

THE CHEMISTRY OF BUILDING MATERIALS.

10.—CLAYS: THEIR COMPOSITION AND PROPERTIES.

CLAY is more extensively used by builders than any other material. It forms the basis of bricks, tiles, terra-cotta, and pottery, and is largely used in the manufacture of cement.

Properties of Clay.—Clay is an insoluble earth which becomes plastic when kneaded with water, and which is commonly found in nature in plastic condition. When a moist, coherent mass of clay is allowed to dry it shrinks, and when the mass is strongly heated it undergoes further shrinkage, and loses its combined water. The purer the clay the greater the shrinkage and, therefore, the purer the clay the greater is the proportion of sand or sand substitute which must be mixed with the clay before it is moulded into bricks or other articles which are required to retain their shape when fired.

Colour of Clay.—Some clays are white, others of various shades of grey, blue, green, brown, and red, and some are black, owing to the presence of organic matter. When fired, black clay usually loses its colour more or less completely through the destruction of the organic matter, white clays become more perfectly white, and the colour of coloured clays is as a rule rendered more vivid.

Colour of Bricks.—White bricks are made from clay almost free from iron. Bright *red* bricks are made with a clay comparatively free from lime and alkalies, but containing a large proportion of hydrated ferric oxide. The bright red colour is due to the formation of anhydrous ferric oxide. Dark *blue* and *purple* bricks are produced by strongly heating clay containing from 8 to 10 per cent. of oxide of iron. The ferric oxide is partly converted into ferrous oxide, which combines with silica to form black ferrous silicate, which, diffused through the mass of brick, gives it a dark blue or purple colour. *Blue* and *black* bricks usually contain small proportions of manganese in addition to iron. *Bluish-green* bricks are produced when clay containing alkalies is used for their manufacture and fired at an unusually high temperature. *Yellow* bricks are produced from clay containing magnesia in addition to iron.

The addition of small proportions of chalk to clay containing iron causes the clay to yield *cream-coloured* bricks if the proportion of iron is small, and *red* or *brown* bricks if the proportion of iron is comparatively large.

Composition of Clay.—The principal constituent of clay is a hydrated silicate of alumina having the formula $Al_2O_3.SiO_2.2H_2O$, but free silica (sand) and oxides of iron, calcium, and magnesium, together with traces of the alkalies, are also common constituents.

The following table shows the composition of some extensively used clays as given by Abney and Knap:—

	Dinas Fireclay.	Stourbridge Fireclay.	Loam.	Blue Clay.	Burham Clay.	Terra-cotta Clay.	London Brick Clay.	Marl.
Silica	86·2	63·4	66·7	46·5	42·92	75·2	49·5	43·00
Alumina	2·3	23·2	27·0	38·0	20·42	10·0	34·3	
Iron Oxide	·3	1·9	1·3	1·0	5·00	3·4	7·7	3·00
Lime	1·0	—	·5	1·2	10·79	1·2	1·4	26·04
Magnesia	—	·9	—	—	·07	trace	5·1	3·50
Alkalies or alkaline chlorides	—	—	—	—	·33	·5	—	—
Carbon dioxide	—	—	—	—	8·12	—	—	20·46
Water	—	—	—	—	6·68	5·9	—	4·00
Organic matter	10·0	10·0	5·0	13·6	5·01	3·7	1·9	—
	99·8	99·4	100·5	100·3	99·34	99·9	99·9	100·00

The Dinas fireclay contains so little alumina that it should be called sand rather than clay. Unlike clay, it also expands when heated, and bricks made with it, although capable of withstanding a high temperature, are very friable and are liable to be attacked by iron or other metals with formation of fusible silicates. The foregoing analyses have been widely accepted as representative of the composition of the various clays, but the statement of the proportion of silica is unsatisfactory, because no distinction is made between the silica combined with alumina and that which exists in a free state. To obtain an estimate of the quantity of free silica present it is possible to assume that the whole of the alumina is in combination with silica in the form of $Al_2O_3.SiO_2.2H_2O$ and to find by calculation the proportion of silica which remains after deducting that in combination with alumina. This method of calculation is not satisfactory, because other silicates of alumina than that mentioned may be present, and because some of the silica may be combined with a portion of the lime and iron.

In recent years it has been the practice in the United States, when analysing clays, to discriminate between the free and the combined silica, as in the following analyses made by the Department of Geological Survey of New Jersey. In view of the fact that the refractoriness of a clay is influenced by the proportion of free silica it contains, these analyses are certainly of more interest than those in which only the total silica is given:—

	Cornish China Clay.	Stourbridge Fire-clay.	Stourbridge Strong Fireclay.
Silica (quartz sand)	37·80	26·80	33·65
Silica (combined)	28·40	30·29	30·50
Alumina	24·11	27·68	22·52
Ferric oxide	·79	1·88	1·43
Titanic acid	·20	1·05	1·00
Magnesia	—	·36	—
Potash	·96	·43	·50
Combined water	7·20	9·36	8·30
Hygroscopic water	·70	1·44	2·10
	100·16	99·29	100·00

Action of Impurities in Clay.—Clay may be regarded as hydrated silicate of alumina mixed with varying proportions of other constituents which may be classed as impurities. The nature and extent of the influence exerted by these impurities is, to a great extent, dependent upon the temperature to which the clay is subjected. A clay for the manufacture of building bricks may be permitted to contain larger proportions

of these impurities than a clay to be used for making firebricks. The principal impurities are :—

Free Silica, or sand, which is a useful constituent of clay, for, although it reduces its plasticity, it also reduces the shrinkage which occurs when the clay is fired. The proportions of sand must not, of course, be excessive ; otherwise the brick or other article manufactured will be deficient in strength.

Free silica, in the absence of fluxes, is infusible at brick-making temperatures, and, therefore, the more sand a clay contains the more fusible it should be. It is, however, asserted by Mr. C. T. Davis, an American authority on brick-making, that the action of free silica in clay used for making firebricks is to render the clay more fusible ; a clay in which nearly all the silica is combined with alumina being more refractory than a clay containing a large proportion of free silica. The fact remains, nevertheless, that in England, at any rate, the fireclays most extensively used contain a large proportion of free silica.

Lime.—Lime renders clay more easily fusible, double silicates of lime and alumina being formed when the clay is fired. The lime is usually present in the original clay as carbonate of lime, but this is converted into silicate when the clay is heated. Lime in small proportions is beneficial for making building bricks, for it causes the grains of clay to partially fuse and to cohere strongly when the brick cools. An excess of lime is prejudicial, because the brick fuses too much and loses shape. Nodules of limestone in a clay are objectionable, because the lumps of carbonate of lime are converted into lumps of quicklime more or less coated with silicate of lime and alumina. The quicklime is liable to slake when the brick is wetted or exposed to the atmosphere, and the expansion which accompanies the change from the anhydrous to the hydrated condition is apt to split or disintegrate the brick.

Oxide of Iron.—The colour of the fired clay is mainly influenced by the quantity and condition of the iron it contains. Ferric oxide is not objectionable in clay to be used for ordinary bricks, but should not exceed 2 per cent. in clay to be employed for firebricks. Ferric oxide is not readily fused, but when heated in a reducing atmosphere ferric oxide is converted into ferrous oxide, which immediately combines with silica to form black ferrous silicate, a compound which readily fuses.

Iron Pyrites is a sulphide of iron (FeS_2) often present in clay. When a brick containing minute particles of this compound is fired, the sulphide of iron is converted into ferrous oxide and gaseous sulphur dioxide. The escaping gas produces small holes in the brick and the ferrous oxide combines with silica to form black ferrous silicate, which appears in the form of black stains in the neighbourhood of the holes. If the clay contain small nodules of pyrites the expansion which accompanies oxidation is liable to cause disintegration of the brick.

Alkalies.—Potash and soda should not be present in larger proportion than 1 per cent., because these alkalies greatly increase the fusibility of the clay. Clays found near the sea or near salt deposits sometimes contain a considerable proportion of sodium chloride and are then unfit for brickmaking, because bricks made with it warp and twist into useless shapes when fired. Alkalies are always present in clays, but if not present in greater quantity than 0.5 per cent. may be ignored.

Carbonaceous Matter is objectionable when present in a form not readily burnt out of the clay by firing, because the brick is darker in colour in the interior than on the surface. Bricks of this description when cut for face work would give the work an unsightly appearance.

Nomenclature of Clays.

Brick Clays, or brick earths, are clays of any description which are used for making bricks or inferior pottery.

Plastic or *Strong Clays* are comparatively pure clays, and require the addition of sand or sand substitute to prevent excessive shrinkage, and of lime to act as a flux. These pure clays are sometimes called "foul" clays.

Loams or *Mild Clays* contain an excess of sand. They require the addition of lime as a flux ; otherwise bricks made with these clays would be deficient in strength. They sometimes contain stones, which must be extracted.

Marls or *Calcareous Clays* contain a considerable proportion of carbonate of lime. If the proportion of lime be too large, bricks made with clay of this description will undergo excessive fusion and lose shape ; but many marls are found of such composition that they may be used for brickmaking without admixture with any other substance.

Malm is an artificial imitation of good brickmaking marl. It is made by mixing ground clay and chalk in a wash-mill, and is sometimes called "washed clay."

Fireclay must be almost free from fluxing materials such as lime and alkalies, and should not contain more than 2 per cent. of ferric oxide. The proportions of these fluxes commonly present in ordinary brick clays renders the clay too fusible for service as fireclay. Fireclays usually contain a large proportion of free silica.

Pottery Clays are comparatively pure plastic clays free from compounds which impart colour to the clay when burnt. Although these clays contain iron, the proportion is so small that the clay is perfectly white after being fired. Owing to their purity they shrink excessively and require admixture with sand or sand substitute. The sand must be free from iron or other colouring agent. China-clay, pipeclay, fuller's-earth and kaolin are names commonly applied to pottery clays. They are frequently grey when in the raw state, but are perfectly white after being fired. The finest kaolin or porcelain clay is almost pure silicate of alumina. Low-grade pottery may be made with coloured plastic brick clays.

Shale is a rock formed of thin layers of hardened clay. It is not so hard as slate, but it may be split into slabs like slate. Slate itself is a form of hardened clay, and shale may be regarded as clay in an intermediate state between slate and ordinary clay. Although not plastic in its natural state, it becomes plastic when kneaded with water.

Burnt Clay.—When clay is heated to redness it loses its combined water and changes its physical character. It cannot be again made plastic by admixture with water, and it may be used as a substitute for sand in brick-making and mortar manufacture. Burnt clay does not differ very widely in its composition from unburned clay, so far as the total proportions of the different elements are concerned, save that the unburned clay contains combined water, and the burnt clay is anhydrous. When a certain proportion of clay has been used in mortar as a substitute for sand it is impossible to ascertain with certainty by analysis whether raw or burnt clay was employed. Yet while burnt clay is harmless, or even beneficial, raw clay is a most prejudicial constituent. As mortar always contains combined water, the presence of this constituent does not indicate that raw clay was used in its manufacture.

ARCHITECTURAL SOCIETIES.

NORTHERN ARCHITECTURAL ASSOCIATION.—An excursion meeting of this Association was recently held at the Hartlepools. The party first visited St. Hilda's Church, where the hon. Secretary read a description of the building from the "Archæologia Æliana," by the Rev. J. F. Hodgson. They then proceeded to the Burbank-street Chapel, over which they were conducted by the Rev. James Barker and the architect, Mr. Garry. All Saints' Church was next visited, after which Mr. Garry provided tea at the Grand Hotel, over which they were conducted by Mr. G. H. Duxbury, the proprietor, and Mr. Garry, the architect. Tunstall Court, the residence of Sir C. Furness, M.P., was next proceeded to, where the party were conducted by Mr. Dixon and Mr. Garry, the architect. Tunstall Manor, the residence of Mr. W. C. Gray, was afterwards inspected.

Correspondence.

BRONLLYS CHURCH.

SIR,—In your account last week of the proceedings of the Cambrian Archæological Association at Brecon you interpolate a statement, apparently emanating from yourself, that the detached bell tower of Bronllys Church was the work of an amateur of recent years. I have not the *Builder* before me at the moment, and so cannot quote your exact words, but believe that I have correctly given their import.

I may say that, as knowing the church in question, I was much astonished at reading such a statement. The tower has the appearance of genuine fourteenth century work ; and Theophilus Jones, the noted historiographer of Breconshire, writing in 1805, describes the tower as follows : "It is remarkable that the steeple, which is detached from the church, is also, contrary to general custom, at the east end. . . . Which is the more ancient building we are not informed either by history or tradition ; both appear to be of ancient date."

Perhaps you can produce the authority for your statement that the tower is modern ?

F. BALDWIN.

*** The statement to which Mr. Baldwin takes exception, namely, the recent date of the detached tower in Bronllys Churchyard, was made at the meeting of archæologists there. That it is a fact there can be no doubt. A local journal observes of the visit, "There was little remarkable about the church [of Bronllys] except its detached campanile, which, however, was not a hundred years old, but was built on the site of a former one." And in the report of a previous visit of Cambrian archæologists to the church, the *Archæologia Cambrensis* for October, 1872, states that "the tower stands detached near the south-east corner of the nave, and has been rebuilt on the site of a former one about forty years ago." We did not say that the work was that of an "amateur."—ED.

GENERAL BUILDING NEWS.

CHURCH, BRIDLINGTON.—The foundation-stone of a new church for Hilderthorpe Parish, Bridlington, to be known as Emmanuel Church, was laid on the 26th ult. The site adjoins Cardigan-road, and the church when completed will accommodate 794 people. It will consist of nave and aisles, with a narthex at the west end, and there will be porches on each side. The scheme contemplates the building at some future time of a parish room on the north side of the church, with communication by a covered corridor. The tower and spire will be at the east end of the morning chapel, and will be 155 ft. high. In the meantime it is only intended to build the nave and the aisle. The architects are Messrs. Brodrick, Lowther, & Walker, Hull and Bridlington.

WESLEYAN CHAPEL, RADSTOCK, SOMERSETSHIRE.—On the 27th ult. the chapel which the Wesleyans have completed at Radstock was opened. Mr. R. Curwen, of London, prepared plans for the new place of worship and schools, the former fronting Fortescue-road, and the school coming out to Church-street. The site goes through from one thoroughfare to the other. The cost of the undertaking is about 5,000*l.*

METHODIST CHURCH, CHESTER-LE-STREET.—A new church, to provide sitting accommodation for 500 people, has been erected at Chester-le-Street for the Primitive Methodists, on a site adjoining the school chapel. Plans were prepared by Mr. J. Walton Taylor, architect, Newcastle-on-Tyne, and the contractors are Messrs. Davison & Bolam, Blaydon & Birtley. The building is of freestone, hand dressed, and it is dominated by a tower supporting a spire. The entrance to the main body of the church is at the south end of the building, and is by a flight of twelve stairs leading to two Gothic doors which again open into a large tiled vestibule, on one side of which are cloakrooms and lavatories, and on the other an entrance to the tower and gallery, which, however, are approached also by a separate flight of stairs and Gothic doorway on the same front as the main entrance. The gallery stretches between the tower and the cloakrooms, and is reached by a staircase leading from the tower. The body of the church and the choir recess are finished with a pitch-pine dado, to match that of the gallery, while the seats are to be of the same material.

METHODIST NEW CONNEXION CHURCH, SHEFFIELD.—A new Methodist New Connexion Church was opened on the 1st inst. at Hillsborough. The church and school have been erected at a cost of 5,500*l.* The buildings have been erected on a plot of land fronting Langsett-road, bounded on the north by Lennox-road and on the south by Dorothy-road, and containing 1,645 square yards. The front of the church is in Lennox-road, the side and the front of the school being in Langsett-road. A portion of the site up to Dorothy-road is reserved for the Manse and caretaker's house. The main frontages up to both roads are of stone. The main features are the tracery windows in the front gable, and a tower and spire at the corner of the building next the two roads. The plan of the church is cruciform in shape, with transepts on each side, and organ recess at the rear, with a gallery over the front entrances and corridors. The accommodation of the church, including gallery and choir seats, is for 450 persons. In connexion with the church are minister's and choir vestries, with separate entrances and conveniences to each. The school has its front entrance from Langsett-road, and the plan provides a large room, 22 ft. by 13 ft. 6 in., which has an entrance from the front vestibule without going through the school. The assembly or school room is 40 ft. by 30 ft., and on the ground floor is a classroom 16 ft. by 13 ft. 6 in., and an infants' room with a separate entrance. In connexion with the school, on the upper floor are four classrooms, two at the front, each 21 ft. 6 in. by 13 ft. 6 in., and also two at the rear. These have a separate staircasing with a projecting gallery at each end of the school for access to the same.

The basement contains a kitchen. There is also a storeroom for tables, &c., and a heating chamber. The roofs are open timbered, with circular ribs to the principals, and are covered with Welsh slates and ornamental red tiles. The benches are open, and all the walls are wainscoted. The windows are glazed with cathedral tinted glass in lead bands. The contractors are: Excavating, drainage, brickwork, stonework, and concreting, Mr. Harris Wood, of Shepley, near Huddersfield; carpenters' and joiners' work, Mr. James Broadbent, of Shepley; plumbing and glazing, Mr. George Lindley, of Shepley; slating and plastering, Messrs. George Beard & Son, of Thurlstone, near Penistone. The whole of the work has been carried out from plans and under the superintendence of the architects, Messrs. J. W. Firth & Son, Oldham.

SCHOOL, MOTHERWELL, LANARKSHIRE.—On the 22nd ult. the new school which has been erected in Glencairn-street, Motherwell, was opened. The building, which is from designs by Mr. James Cowie, architect, Motherwell, is in the Italian Renaissance style, and is constructed on the central hall system, and is fitted up with all modern conveniences and lighted by electricity. Accommodation is provided for 840 children.

BOARD SCHOOL, RAMSBOTTOM.—The new Peel Brow Board School, Ramsbottom, is the first school erected by the Ramsbottom School Board. The school, which has been opened for the reception of scholars, has been erected from the designs of Mr. Thomas Bell, of Burnley, at a cost, including the site, of over 8,000*l.* It provides accommodation for 600 scholars, 400 mixed, and 200 infants.

SEA BATHING INFIRMARY, SCARBOROUGH.—At the Royal Northern Sea Bathing Infirmary, Scarborough, a new chapel was dedicated recently, and a new wing of the Infirmary was opened. The new wing was erected in order to provide better accommodation, and includes a private chapel, an isolation ward, &c. The additions to the infirmary consist of a large block of buildings two stories high, in the rear of the present main building, and connected therewith by a wide stone staircase. It contains two eleven-bed wards, one nine-bed ward, and two one-bed wards or isolation wards, besides nurses' room, bath-room, &c. In addition, there is a small permanent chapel with chancel, seating about eighty, and a small vestry. In the chancel there are two stained-glass lancet windows, with figures of St. Peter and St. Paul, and over the altar a rosewood screen, with sacred monogram, by Messrs. Burlison & Grylls. The altar and altar ornaments are from Messrs. Jones & Willis, of Birmingham. The old wards in the main building overlooking the sea have been converted into day rooms. The total cost of the additions will be a little over 2,000*l.* Mr. C. Edeson was the architect, and Mr. John Barry the contractor.

COLONY FOR EPILEPTICS, SANDLEBRIDGE, CHESHIRE. — At Sandlebridge, near Alderley, Cheshire, are being erected a series of homes for epileptics. The buildings now in progress provide accommodation for 260 adults (130 of each sex), and also for eighteen boys and the same number of girls. The sexes are to be kept apart throughout, and neither the whole of the men nor the whole of the women will be housed together. There are residences for patients, and an administrative block, infirmary, kitchens, workshops, recreation hall. The buildings are Elizabethan in style. The villas each accommodate about two dozen patients. The electric light, generated on the spot, is laid on throughout. The recreation hall, which may be used either as a theatre, concert room, or chapel, has its stage (with trap door) and dressing rooms and an expansive gallery. The whole of the buildings are being erected by Messrs. William Brown & Son, of Salford, and the engineering contract is being carried out by Messrs. Mather & Platt, Manchester. Mr. Alex. Graham, London, is the architect.

A NEW PAVILION AT BOURNVILLE. — Messrs. Cadbury Brothers, Ltd., have opened the new pavilion at Bournville, which they present as a gift to their workmen, as a memorial of the Coronation. The pavilion forms a club-house built after designs by Mr. Lewin, architect to the firm, in the half-timbered style, the wood employed being solid black oak. The gymnasium is fitted with a variety of apparatus under the superintendence of Mr. G. L. Platnauer. On the second floor are a refreshment-room, two dressing-rooms, bathrooms and lavatories, and a luncheon-room. A balcony, laid with asphalt, and entered from the gymnasium, overlooks the football and cricket ground. The cost of the structure amounts to 3,500*l.*

BUILDING SCHEMES, GOVAN.—On the 23rd ult. the new stables of the Cleansing Department, Govan, were formally opened. The new buildings have been erected at a cost of 7,500*l.* from plans prepared by Mr. F. G. Holmes, the Burgh Surveyor.

INSTITUTE, NEWBOROUGH, ANGLESEY.—On the 26th ult. the foundation-stone of the Pritchard Jones Institute was laid at Newborough. The site is on the road from Newborough to Gaerwen, and the institute will front the Menai Straits. Comprising some 26,000 square yards, the site will have three cottages or almshouses on each side, and the institute at the end, furthest from the high road, the quadrangle before it being laid out as a garden. The institute is Elizabethan in style, the cottages being arranged to harmonise. From the ground floor to the first floor the building is to be of grey Anglesey granite, with dressings of Ruabon stone, and the upper part is treated in half timber, with two gables divided by a clock tower over the entrance hall. The tower will be of granite to the domed roof, which, with the finial, will be of copper. On the ground floor to the left of the vestibule is the library, 45 ft. by 30 ft., and on the right a smoking-room and a coffee-room. Over the library is an assembly hall of similar dimensions, and over the coffee-room a reading-room. All the necessary offices, such as kitchens, cloak-rooms, and committee-rooms are provided. The internal woodwork is to be of selected pitchpine. Mr. R. Lloyd Jones is the architect.

ISOLATION HOSPITAL, TANFIELD.—A new isolation hospital for infectious diseases has just been opened at Tanfield. The designs of Mr. George T. Wilson, of Blackhill, were accepted for the carrying out of the work. The administrative block is situate in the centre, with separate wards for males and females on either side, each being connected by long corridors. The administrative building consists of matron's and nurses' sitting-rooms on the ground floor, a medical superintendent's surgery, and a kitchen, scullery, and a general storesroom. Upstairs are bedrooms, bathrooms, lavatories, &c. Each wing contains sixteen beds, so that provision is made for thirty-two patients. There are nurses' dayrooms and small convalescent wards in each wing. The building is of stone. The whole of the floors are laid in marble terrazzo. Every angle in the building—walls, floors, and ceilings—is rounded off. There are patent removable windows. The cost of the erection, exclusive of the site, is 8,000*l.*

SCHOOL OF ART, FALMOUTH.—At Falmouth, on the 26th ult., Sir William H. Preece, K.C.B., F.R.S., opened a new School of Art. The architect of the new school is Mr. Cardwell (Penzance). The school is a two-story building of ordinary local stone, with brick quoins and rough cast panels. The total cost of the erection is 1,300*l.*

CONVALESCENT HOME, SWANSEA HOSPITAL.—The foundation-stone has just been laid on the hillside above Cwmdonkin Park, Swansea, of a convalescent home, to be used in connexion with the Swansea Hospital. Having a south-west aspect, the building will be approached from Terrace-road. The home consists of three blocks. The centre one is the administration block, and on either side, approached by open corridors, are two ward blocks, one ward for men and one for women. On the ground floor of the administrative block is the entrance-hall, with waiting and staff rooms, large dining-hall (for use of all patients), with kitchens and offices in close proximity, and a loggia in front running the whole length of the room. On the first floor are arranged bedrooms for the staff and nurses, with bathroom, lavatories, &c. The accommodation provided in each ward block is a large dayroom, a ward for ten beds, bathrooms and lavatories, with verandahs running the whole length of the buildings. This provides accommodation for twenty patients. The work generally will be of local stone, with brick quoins and rough cast. The top floor of the administrative block will have the walls covered with red Broseley tiles, and the roofs will be covered with terra-cotta slates. The architect is Mr. Glendinning Moxham, and the contractor Mr. Griffith Davies.

SANITARY AND ENGINEERING NEWS.

THE NEW THAMES TUNNEL.—Messrs. J. Cochrane & Sons have completed the construction of the subway underneath the river from Millwall to Greenwich. The tunnel, being 1,217 ft. in length and having an inner diameter of 11 ft., lies 60 ft. below high-water level, and the crown of the arch is 13 ft. from the river bed. The tunnel was driven with a "shield" worked with compressed air from the Middlesex side in the short period of eight months, but the works in all have occupied nearly three years, at a cost of 120,000*l.* The northern approach at the western end of Island Gardens, close to the North Greenwich Station, and the southern approach at the northern end of Church-street, behind the famed Ship tavern, lead to circular shafts 35 ft. in diameter, containing stairways and lifts. The tunnel is built for the London County Council, and the work was superintended by Mr. W. C. Copperthwaite, the Council's Bridges' Engineer, Mr. Maurice Fitzmaurice being their Engineer-in-Chief.

ABERDEEN WATER SUPPLY.—The Report of Mr. Hawksley, C.E., who has been for some time engaged in considering the question of a new water supply for Aberdeen, has now been forwarded to the Town Clerk, and in due course it will be laid before the Water Committee and the other members of the Town Council. It is understood that Mr. Hawksley favours a new source of supply from a point above Ballater.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENT.—A consolidation of R. Waygood & Co., Limited, and the Otis Elevator Co., Limited, has been effected, and the joint business will in future be carried on under the title of "Waygood & Otis, Limited." The new company will become possessed of the patents, designs, and experience of the Otis Co., U.S.A., in addition to the manufacturing facilities of R. Waygood & Co. Mr. H. C. Walker, chairman and managing director of R. Waygood & Co., will be chairman, and together with Mr. R. Percy Sellon, M I E.E., managing director of the Otis Elevator Co., Limited, will act as joint managing director of Waygood & Otis, Limited.

TWO HAMPSHIRE PROPERTIES FOR SALE.—The house known as "The Wakes," at Selborne, occupied by Gilbert White in the interval 1755-93, is offered for sale, and a proposal is made that it should be purchased for the nation. Additions have been made to the house since White's time, but the older portions (together with the garden, the old walls, bricked path, rain-gauge, and sundial), remain almost as they were when inhabited by him, and when he wrote to Barrington and Pennant the series of letters which his brother Benjamin published, 1789, in London. In the same county stands Hildon House, which has been placed in the market. It is situated upon high ground near Romsey. The estate, traversed by the river Test, extends over 1,100 acres, of which 340 acres form a park around the house, that was rebuilt for Sir Augustus Webster, Bart., by Messrs. Jenkins & Son, of white Suffolk brick with Bath stone dressings and green slate roofs, on an extensive plan, after Mr. Aston Webb's designs. The gardens were laid out by Mr. H. E. Milner. The house—see our illustrations of June 18, 1898—has a terrace along its south side, the rooms are arranged upon one side only of the corridors which overlook the courtyard, and the wings are canted away from the court for the sake of the view and to soften the angles.

THE METROPOLITAN PUBLIC GARDENS ASSOCIATION.—The Association signify their readiness to put in order the graveyard of St. Mary Church, Whitechapel, provided the Stepney Borough Council will agree to maintain it as a public garden; and have under their consideration also proposals for making a riverside walk at Chiswick, the preservation of St. Peter's-square, Hammersmith, and of an estate at Upper Clapton, together with Mr. E. N. Buxton's project (which we recently described) to acquire 800 acres formerly appertaining to Hainault Forest, in Essex. The Association recently decided to plant trees by All Saints' Church in Norfolk-square, Paddington, in Shepherdess-walk, Hoxton, and Great Cambridge-street, Shoreditch, and to oppose schemes for building on the disused churchyard of St. James's, Clerkenwell—now maintained as a public garden—and for advancing the building line of frontage over certain garden forecourts in Euston-road, St. Pancras.

THE COURT OF COMMON COUNCIL.—The Corporation have expressed their willingness to co-operate with the London County Council in an application to the Government to promote legislation in the next Session of Parliament for obtaining statutory powers to regulate the breaking up by companies and others of thoroughfares in London, upon an understanding that the Corporation shall retain complete and absolute control over the streets within the limits of the City.—The Corporation have accepted a tender of 282,000*l.* made by Messrs. Holloway Bros. for the rebuilding of the Sessions House in Old Bailey, together with the demolition, which is already taken in hand, of Newgate Prison, and have approved the plans for the construction of a subway between the stations at Finsbury-pavement of the City and South London and the Great Northern and City Railway Companies.

PUBLIC IMPROVEMENTS, WOLVERHAMPTON.—At Wolverhampton, on the 26th ult., Mr. M. K. North, on behalf of the Local Government Board, held an inquiry into the application of the Town Council for sanction to borrow 5,500*l.* in connexion with the improvement of the Town Hall and public offices, 3,229*l.* for purposes of street improvement in New Hampton-road, and 3,000*l.* in respect of the new covered wholesale market. There was no opposition shown. Mr. H. Kendrick (assistant town clerk) stated that the original loan applied for respecting the Town Hall alterations was 11,074*l.*, but that was before the receipt of the builders' estimate, which amounted to 12,655*l.*, and several items of additional expenditure were also included. With regard to the second amount, it was explained that the holding of the Wolverhampton Art and Industrial Exhibition rendered the immediate laying of a double line of track in the New Hampton-road necessary, and this necessitated the purchase of property. With regard to the covered wholesale market, the Local Government Board last year sanctioned a loan of 13,850*l.*, and allowed twenty-six years for its repayment. Since that date several alterations had been thought of with a view to the increased usefulness and efficiency of the market and the augmentation of revenue. The cost of the scheme had been increased by 3,000*l.* Mr. George Green, the Borough Engineer, gave evidence in support of the application.

MEMORIAL FOUNTAIN, SPRINGBURN, GLASGOW.—Some time ago Cowlairs Co-operative Society decided to present a drinking fountain to the city on the celebration of their majority. On the 22nd ult. the unveiling ceremony took place. The fountain is situated in Vulcan-street, Springburn. It is

by Messrs. Scott & Rae, sculptors, Glasgow, and has a base of 6 ft., a height of 12 ft., and is of marble.

ARCHÆOLOGY IN SOUTHERN ITALY.—Mr. Neville-Rolfe, our Consul in Southern Italy, in his supplementary report for the past year mentions the chief recent incidents of archæological interest. He says that for the last half century Cuma has yielded up treasures from its necropolis. The Count of Syracuse obtained a gallery of vases from it about fifty years ago. Mr. Stevens succeeded him at a short interval. Both these collections are now the property of the nation. For the last few years of the work of Mr. Stevens nothing of great interest was found, and it was thought that the necropolis was exhausted, but an Italian landowner has begun again with praiseworthy perseverance. After finding a statue and other objects of the Greek period, he came upon a tomb in which was a tortoise-shell disc, a unique object which experts pronounce to have been a mirror. It is not impossible that it was the back of a mirror of which the reflecting surface has disappeared. This surface in ancient mirrors was silver-plated on bronze, and such mirrors are frequently found in the tombs of Greek and Roman ladies, with highly ornate backs made sometimes of silver, but usually of bronze and decorated with bas-reliefs or incised drawings. No tortoise-shell has ever been found before. In the neighbourhood of Cuma some further interesting tombs have been discovered, and these are thought to be pre-Hellenic. One of them contained objects of silver and bronze, besides being rich in ornaments made of electrum, an alloy of gold and silver. Electrum objects are rare, the great collection of them by Baron Marcello Spinelli having been found on his estate a few miles from Naples, and considered till now unique. It has never occurred to any one, says Mr. Neville-Rolfe, to call these objects pre-Hellenic before. Pompeii has only yielded one object of great importance, a small statue of Perseus, about 20 in. high, of very spirited execution. The subject is unique as far as ancient sculpture is concerned. A second bronze organ has also been discovered very similar to the one found some twenty years ago. They are in the form of a syrinx or Pandean pipe, but are so large that they must have been blown with bellows or with a windbag like bagpipes. There is very little doubt that the modern organ was evolved from the syrinx, blown by mechanical means. The entire reorganisation of the Naples Museum has been a great feature of the past year. A vast number of objects, hitherto not exhibited, have been brought to light, much more space has been granted, and many of the objects have been named. The entire museum was re-numbered about sixteen years ago, and the new arrangement has thrown these numbers into confusion. The Consul thinks it would be of great service to students were the collection re-numbered separately—that is to say, if a series of numbers were given to the marbles, another to the frescoes, and so on, since by renumbering the museum as a whole upwards of 120,000 exhibits have been reached. An arrangement has been made with the Italian Government in regard to the magnificent frescoes found on private ground at Boscoreale, near Pompeii, whereby some of the pictures will remain the property of the Government, and the remainder will be allowed to be exported. The expenses amount to a very considerable sum, but the frescoes are of unexampled breadth of treatment, and are in value far beyond any yet found. Some interesting catacombs have been discovered running beneath the Monte di Dio in Naples. The entrance to them was discovered on pulling down some houses in Santa Lucia. They extend a long way into the hill, and are probably of the Roman period. As they have not been opened to the public no scientific account of them has yet appeared.—*Times*.

REREDOS, CHORLEY PARISH CHURCH, LANCASHIRE.—A reredos has just been erected in the ancient parish church of Chorley as a memorial to the late Mrs. Rawcliffe. It is composed of Portland stone and white and red-veined marble. The centre part consists of three pinnacles, divided by marble columns. The middle panel contains a floriated cross and the side panels figures of angels holding a chalice on a crown of thorns. The sides are arcaded in Portland stone, with marble columns. The work has been executed by Mr. Martin, of Cheltenham, from designs by Messrs. W. and C. A. Bassett-Smith, architects, of London.

BOARD OF EXAMINERS, INSTITUTE OF ARCHITECTS.—Sir Wm. Emerson, on the invitation of the Board of Examiners of the Institute of Architects, has accepted the position of Chairman of the Board, Mr. Aston Webb, A R A., having resigned the office on his election as President of the Institute.

RESTORED CROSSES.—All persons interested in Lancashire's ancient memorials will be glad to know that of the stone crosses which for centuries stood high and solitary in the uplands of the Forest of Rossendale two are to have speedy restoration. The sites are on Gamelside Moor, near Rawtenstall, at an altitude of over 1,150 ft. above ordnance datum. Mr. Alderman Compston, of Crawshawbooth, a representative of Rawtenstall on the Bury and District Joint Water Board, has the credit of rescuing the remains from oblivion, and of securing restoration by the Water Board. The age of the crosses is unknown. They may be pre-Norman; but Mr. Compston relates them to the Norman period (or at latest to Plantagenet Edward I.), not less than 600 years ago. The crosses were probably part of the great system of moorland waymarks, when all local roads or tracks led to Clitheroe and (later) to Whalley.—*Manchester Courier*.

PROPOSED STREET IMPROVEMENTS, DEVONPORT.—An inquiry was held at the Municipal Offices, Devonport, on the 28th ult., by Mr. W. O. E. Meade-King, M.Inst.C.E., one of the inspectors of the Local Government Board, into the application made by the Devonport Borough Council for sanction to borrow 2,361*l.* for the works of street improvement in Saltash-road, 1,500*l.* for the purpose of paying off loans raised on mortgage of certain sewage lands, and 21,560*l.* for the construction of new streets, the laying of sewers, &c., and also for sanction under Section 21 of the Devonport Corporation Act, 1900, to appropriate and use certain surplus land originally acquired for cemetery purposes, and adjoining Weston Mill Lake, for the purpose of the last-mentioned scheme. Among those present were Messrs. H. Lee, representing the Town Clerk (Mr. A. B. Pilling); Cecil Stowe, Assistant Borough Surveyor; Dr. Brough, Deputy Medical Officer of Health; and G. T. Geaton, Sanitary Inspector.

THE AMALGAMATED SOCIETY OF CARPENTERS AND JOINERS.—The members of the Amalgamated Society of Carpenters and Joiners recently took a vote upon the question of whether or not the society should undertake house building on the co-operative principle. This shows a large majority in favour. In various centres the society will undertake building work, and to provide the capital for this the members have agreed to a special levy of 6d. per week for four weeks, which it is estimated will produce a sum of 6,000*l.* Under the Trade Union Acts the society is not allowed in itself to undertake speculative business, and to get over this it will be worked by a special board of management apart from the society, and in connexion with which a new set of rules has been registered under the Industrial Societies Provident Act.

WHITWORTH SCHOLARSHIPS AND EXHIBITIONS.—The following is the list of candidates successful in the competition for the Whitworth Scholarships and Exhibitions, 1902:—Scholarships, of the value of 125*l.* a year each (tenable for three years): W. M. Selvey, London; L. Bairstow, Halifax; I. V. Robinson, West Hartlepool; A. Baker, Gosport, Hants. Exhibitions, of the value of 50*l.* each (tenable for one year): C. Cook, Landport, Portsmouth; J. S. Mitchell, Uddingston, near Glasgow; C. J. Stewart, Fratton, Portsmouth; A. H. Gibson, Sowerby Bridge, Manchester; W. E. W. Millington, Hollinwood, Oldham; N. J. Maclean, Kelvinside, Glasgow; H. J. Jones, Southsea; H. Rawstron, Oldham; G. H. Childs, Portsmouth; N. L. Ablett, London; W. E. F. Curror, Ilford, Essex; W. L. Port, Brighton; J. Alexander, Glasgow; L. D. Stansfeld, London; R. J. A. Pearson, Sheffield; W. L. Perry, Plymouth; A. S. Angwin, London; F. G. Steed, Devonport; H. A. Bagg, London; F. J. Crabbe, Southsea; A. Garrard, Forest Gate, E.; B. J. Thomas, Devonport; M. B. Dalby, Gateshead; T. Wadhams, Wolverton; O. S Spokes, Crewe; J. Crone, Charlton, Kent; A. B. Sowter, Glasgow; F. Sykes, Huddersfield; F. E. Rebbeck, Belfast; F. W. Harris, Swindon.

LEGAL.

ANCIENT LIGHT DISPUTE SETTLED.

THE case of Ellis *v.* Skillington was in the list for hearing before Mr. Justice Swinfen Eady in the Vacation Court on Wednesday last, the 3rd inst., on a motion by the plaintiff for an interim injunction to restrain the defendant, until trial or further order, from erecting buildings so as to obstruct plantiff's ancient lights.

Dr. Napier stated that, as the parties had agreed to terms, it was proposed, with his Lordship's sanction, that no order should be made on the motion.

His Lordship assented to this course being adopted.

BUILDING DISPUTE IN THE VACATION COURT.

THE case of Johnson *v.* Bernstein came befor Mr. Justice Swinfen Eady in the Vacation Court on Wednesday, the 3rd inst., on a motion by the plaintiff for an interim injunction to restrain the defendant, until trial or further order, from erecting buildings so as to obstruct the plaintiff's ancient lights in Nos. 45 and 47, Great Arthur-street, Golden-square.

Before the motion was opened, Counsel for the defendant stated he was instructed that the plaintiff's premises were likely to be the subject of a sale from the plaintiff to the defendant, and that the contract was to be signed that afternoon. He therefore asked that the motion should be directed to stand over.

After some discussion, his Lordship ordered that both parties should give an undertaking to sign the contract as it now stood; and on the defendant undertaking not to build so as to obstruct any of the ancient lights of the plaintiff before the purchase was completed, and on the plaintiff giving the usual undertaking in damages, he directed that the motion should stand over till the second motion day next sittings.

RECENT PATENTS:

ABSTRACTS OF PATENTED INVENTIONS.

8,869.—A METHOD OF MOISTENING AND HEATING AIR: *F. Watson*.—A fan worked by a strap draws air through the trunk of the apparatus, water flowing from a pipe over the fan—or steam from an annular pipe—moistens and cools the air, which may also be warmed by the steam, and is dispersed with a revolving nozzle. By closing a valve in the upper arm of the trunk, and closing a door below the valve, air may be drawn away from a spinning or weaving shed.

8,870.—AIR PIPES FOR MINE-VENTILATION: *A. Zaczek*.—The air pipes are formed of a wire spiral which has outer and inner coverings of paper, so as to constitute a doubly-walled tube. Spigot, bayonet, or other joints are made out of metallic rings that form the ends of the pipes. Fire and waterproof paint may be applied to the paper covering, both within and without.

8,884.—COLLAPSIBLE GATES: *A. F. Bataille*.—The metal gates consist of bars disposed diagonally in pairs, and of which the ribs are joined to one another with pivot pins—in one shape the bars and ribs being arranged vertically; the bars will overlap when the gate is shut by means of the transverse lazy-tongs.

8,894.—A SELF-CLOSING VALVE: *S. A. S. Hass*. A partition and flanged end wall form a portion of the casing, through which a tube will slide. A fastening secures to the end wall a leather packing-sleeve, which a spiral spring forces against the tube. There is a handle with which the closed inner end of the tube can be caused to slide away from the outlet, and thereby expose a set of openings through the tube near its other end.

8,907.—A MITRE-SHAPED ROTATORY CUTTER: *A. F. Norris*.—The tool is especially intended for cutting shouldered recesses in the stiles of door frames, and so on. The bearing faces of the cutter-block are inclined as tangents to a cone that is set concentrically with the axis upon which the block turns. Clamping-bolts are inserted through transverse slots in the cutters, and the ends of the bolts fit into a dovetailed groove which is parallel to the edge of the cutter. A triangular wedge, which a screw working in a bracket on the wedge will fix in the position desired, effects the adjustment of the cutters; or that may be done by means of a guided plate which is clamped with a bolt in a slot. The work is fed across the top of the rotating cutter.

8,920.—AN ELECTRICAL SWITCH: *F. E. Spagnoletti*.—A switch that can be changed over from one circuit to another has its two arms pivoted at a common point on to a support, and are joined with springs to a frame pivoted on to the support at that same point and fitted with a handle. The switch is held open with catches. When, the switch being "on," one wishes to change over, the handle is moved so as to extend one of the springs until the heel of one of the arms raises that arm, so that the spring will give a quick break.

8,951.—A PLUG COCK FOR MEASURING PURPOSES: *M. Martin*.—The plug cock has a hollow horizontal plug which a cross-diaphragm divides into two parts, of which the capacities are equal to one another, and ports are disposed into two crossing meridian planes.

9,004.—A PLATFORM FOR USE WITH LADDERS: *E. Bardin*.—Beneath the top-step of a hinged ladder are arms on to which is pivoted a folding platform, and links which are pivoted on to both the platform and the ladder carry a guard-rail, a cross-bar, and a tool-box; notches cut in the bars of the platform take the cross-bar of the back supports when the ladder is opened. The platform, links, and tool-box will be folded up between the back supports when the ladder is closed.

9,043.—A CARRIER FOR PICK-BLADES: *F. Smith*.—The carrier has lugs that are bridged by a bolt which works in a slot and has a nut. The pick-blades are laid between the lugs which have tongues that will engage with the recesses of the blades and there are shields for the points of the blades. If the shields are made so as to project downwards a collar passed through one of a set of holes in the lugs will hold up the blades.

9,048.—FITTINGS FOR ELEVATORS: *P. M. Pritchard*.—The bearings that carry the shaft of the lower sprocket-wheel are caused to slide vertically in guides, and there are helical or C-springs that, under normal conditions, press them downwards, whereby the buckets will yield upwards so as to prevent any jamming of lumps of the material between the buckets and the casing.

9,069.—MEANS FOR HEATING ROOMS OF BUILDINGS: *F. W. Foster and E. P. Compton*.—The inventors utilise the heat that commonly escapes to the chimney by joining to the chimney a divided chamber or drum by its elbowed part. A damper-plate sliding lengthwise regulates the flow of the products of combustion. The dampers can be folded, and are hinged on to the edges of the body portion, being worked from without with rods. A straight, divided pipe, fitted with a cap, will serve for the drum.

9,141.—A FRAME FOR LAVATORY BASINS: *G. D. Innes*.—An adjustable support or frame for the

basins is composed of two side pieces and a front piece, the latter being secured with bolts to the former. The side pieces are adjustably bolted on to brackets by means of slots cut in them.

9,166.—AN APPLIANCE FOR CLOSING DOORS: *F. G. Kelly, C. Kelly and F. Pritchett.*—The lever which carries the door is mounted upon a pivot having a crank which has a roller at its end. The curved extensions of two levers surround the roller. The two levers are pivoted on to the frame, and composite springs force them towards one another, so that whenever the door is opened from either side it will become automatically closed through the action of the springs upon the ends of the levers.

9,193.—AN APPLIANCE FOR THE STARTING SWITCH OF AN ELECTRICAL CRANE, CAPSTAN, OR SIMILAR MACHINE: *Sir W. G. Armstrong, Whitworth & Co., and F. Honner.*—For the pedal action of a starting-switch the inventors connect the liquid starting-resistance by means of a rope that is passed around pulleys to the weighted end of the lever of which the other end is to be pressed by the foot. A chain from a point of the pedal-lever between its pivot and weighted end is attached to a weight. The rope from the starting-resistance is connected by a pivoted lever (placed between the resistance and the first pulley) to another weight at the remoter end of that lever. Slow speed will be engendered by a certain amount of pressure upon the pedal that will lift the last-mentioned weight, but for high speed it will be necessary to press harder so as to lift the other weight as well.

9,200.—A GUIDE FOR BAND SAWS: *H. Harris.*—The invention provides also for the lubrication of the saw before it passes through the guide, which is arranged above the table and takes the shape of a disc carried by a spindle having ball-bearings. The saw passes between wooden blocks that are secured adjustably to the face of the casing; the line of contact of the back of the saw with the face of the disc is at a suitable distance from the centre of the disc. A similar guide is put beneath the table also. An oil from a cup drips into a channel that conveys it to brushes which rub against the side of the saw.

9,217.—AN ELECTRICAL CUT-OUT: *D. & W. Fuse Co.*—The fusible cut-out has an auxiliary fuse wire for minimising sparking and for showing the condition of the cut-out. All but the middle part of a casing, which has metallic caps at its ends and encloses the main fuse, is filled with slaked lime or similar material, and a paper drum is inserted in the middle portion. The end caps clip the subsidiary fuse, which is threaded through holes in the casing, a portion of it being left without and enwrapped in a paper strip that has a middle hole covered with gunpowder or sulphocyanide of mercury that will indicate when the fuse has blown. In other forms the auxiliary fuse is directly connected to the main fuse, or the whole of it may be outside the casing, or a part of it may be rendered visible through a slot.

9,222.—IMPROVEMENTS IN INCANDESCENT GAS LAMPS: *F. Fischer.*—Additional air, for increasing the illuminating power, is admitted to the base of the flame through apertures in the globe-holder. The customary chimney may be discarded for a globe having its lower and upper ends contracted. Otherwise the globe-holder may either be rested directly upon the burner supports, or be slipped over the chimney-holder.

9,238.—CONSTRUCTION OF KILNS: *F. H. Smith and F. Smith.*—For a down-draught kiln the inventors devise passages or flues, to be regulated with dampers, and cause hot air from one kiln which is becoming cool to be conveyed to another kiln which is becoming hot. The hot air-flue from the one to the other has two branches that communicate with the ends of the kilns, and both of the latter are joined to an underground flue which is connected to the chimneys.

9,257.—FITTINGS FOR AUTOMATICAL FIRE SPRINKLERS: *International Sprinkler Co.*—Two levers which sustain the valve are disposed in such a manner that they will hold up the valve so long as their ends are joined by soldered plates, but they will fall when the heat of the fire has melted the soldered joint of the plates; a revolving distributer is carried by the head of a screw underneath the lower of the two levers, two concentrical flanges are fashioned upon the upper face of the distributer, and one of them has inclined slots which will produce a rotation of the disc as the water jet strikes them; the nozzle may be inverted, and provision is made for dispersal of the water through orifices in the distributer.

9,262.—A MACHINE FOR CUTTING DOVETAILED MORTISES AND TENONS IN BOARDS: *P. Hansel.*—On to two inclined shafts that are geared together or have a Hook's coupling, are fixed arms that carry the cutters, a belt-pulley drives one of the shafts and the other turns at an equal speed. The movement of the cutters in planes inclined towards one another at the angle desired causes them to cut out a dovetailed recess between two tenons as the board is fed downwards from above them. The board is then advanced one step by the removal of a pawl from the teeth of the rack and the turning of a pinion until the pawl has fallen between the next pair of teeth. A similar machine is available for cutting mortises, the board being applied—with a tangential feed instead of a radial one—at the point of intersection of the planes of the cutter-wheels.

9,265.—ARC LAMPS: *T. W. Young.*—Inclined troughs carried by springs hold the carbons by similar troughs mounted upon headed pins and fastened by insulating-sockets to the ends of an expansible metallic strip, which is enveloped with a coiled heating-resistance connected in series with the carbons, so that the heated strip as it expands will force the moveable troughs against the carbons to separate them with a sufficiency of current, but will let them move together and slip downwards with a decrease of current. The ends of the heater or solenoid wires are joined on to both parts of one of the retaining springs, which an insulator divides. Various adaptations are specified.

9,276.—A METHOD OF HEATING WITH ELECTRICITY: *I. Timar.*—For a heater is contrived a wire, which is wound in slots cut in bars of slate or other incombustible, non-conducting substance, that are disposed upon metallic bars inserted in radial slots in end-plates carried upon metallic angles, which serve also for making the electrical connexions.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

August 16.—By FERRIS & PUCKRIDGE (at Reading).

Brimpton, &c., Berks.—The Blacknest Estate, 128 a. 2 r. 2 p., f., p.	£4,533

August 20.—By Messrs. BALLS (at Braintree).

Sible Hedingham, Essex.—The Hostage Estate, 190 a. 1 r. 10 p., f., y.r. 232*l.*	2,410

August 21.—By A. G. & A. NOTLEY (at Lowestoft).

Barnby, Suffolk.—The Crossway Farm, 129 a. 2 r. 10 p., f., y.r. 111*l.*	2,600

August 23.—By M. DEROME & SON (at Kendal).

Grayrigg, &c., Westmoreland. — Beckhouses, Broadhead, Browhead, and Simgill Farms, 362 a. 0 r. 37 p., f., y.r. 319*l.*	10,600

By BEADEL, WOOD, & Co., and EDWIN J. GILDERS (at Frinton).

Frinton-on-Sea, Essex.—Oxford-rd., three plots of land, f.	195
Third-av., plot of building land, f.	200

August 26.—By JOHN BOTT & SONS.

Herne Hill.—267, Norwood-rd., u.t. 69 yrs., g.r. 6*l.* 6s., e.r. 52*l.* 10s.	555
17, Rymer-st., u.t. 44 yrs., g.r. 5*l.* 10s., w.r. 36*l.* 8s.	220

By THORNBORROW & Co. (at Penrith).

Pooley Bridge, Westmorland.—Eusemere Estate, 53 a. 2 r. 8 p., f. and c.	5,550

August 27.—By GIBBS & WINTERTON.

Lambeth.—17, Tenison-st., u.t. 20¾ yrs., g.r. 6*l.* 10s., y.r. 48*l.*	275
St. George's, East.—94, 96, and 98, Christian-st., u.t. 20¾ yrs., g.r. 75*l.*, y.r. 136*l.* 10s.	125

By RICHARDSON & MARTIN.

Soho.—1 and 2, Tyler's-court, u.t. 145 yrs., g.r. 11*l.* 18s. 9d., y.r. 98*l.* 16s.	540

August 28.—By HENRY SMITH & SON and EDGAR H. BILLINGHURST.

Holloway.—2 and 4, Archway-rd. (S), f., y.r. 150*l.*	3,030
12, Archway-rd. (S), u.t. 61 yrs., g.r. 5*l.* 5s., y.r. 65*l.*	1,020
33, Victoria-rd., u.t. 32 yrs., g.r. 5*l.*, y.r. 30*l.*	200
Archway-rd., f.g.r.'s 12*l.*, reversion in 72 yrs.	385

FRED. VARLEY & SON.

Finchley.—Finchley Park, Holly Dene, and ¼ acre, f., p.	775
Stroud Green.—46, Oakfield-rd., u.t. 75 yrs., g.r. 8*l.* 10s., y.r. 46*l.*	495

August 29.—By A. J. SHEFFIELD.

Poplar.—103 and 105, St. Leonard's-rd., u.t. 37 yrs., g.r. 1*l.* 5s., y.r. 67*l.* 12s.	420
28, Susannah-st., f., y.r. 33*l.* 16s.	400
East Ham.—70, Gladstone-av., f., y.r. 30*l.*	485

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; w.r. for weekly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks	1 13 0	per 1,000 alongside, in river
Rough Stocks and Grizzles	1 10 0	" " "
Facing Stocks	2 12 0	" " "
Shippers	2 5 0	" " "
Flettons	1 8 0	" at railway depôt.
Red Wire Cuts	1 12 0	" " "
Best Fareham Red	3 12 0	" " "
Best Red Pressed Ruabon Facing.	5 5 0	" " "
Best Blue Pressed Staffordshire	4 6 6	" " "
Do., Bullnose	4 11 0	" " "
Best Stourbridge Fire Bricks	4 8 0	" " "

PRICES CURRENT (*Continued*).

BRICKS, &c.

	£ s. d.	
GLAZED BRICKS.		
Best White and Ivory Glazed Stretchers	13 0 0	per 1,000 at railway depôt.
Headers	12 0 0	" " "
Quoins, Bullnose, and Flats	17 0 0	" " "
Double Stretchers	19 0 0	" " "
Double Headers	16 0 0	" " "
One Side and two Ends	19 0 0	" " "
Two Sides and one End	20 0 0	" " "
Splays, Chamfered, Squints	20 0 0	" " "
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	" " "
Quoins, Bullnose, and Flats	14 0 0	" " "
Double Stretchers	15 0 0	" " "
Double Headers	14 0 0	" " "
One Side and two Ends	15 0 0	" " "
Two Sides and one End	15 0 0	" " "
Splays, Chamfered, Squints	14 0 0	" " "
Seconds Quality White and Dipped Salt Glazed	2 0 0	" less than best.
Thames and Pit Sand	7 0	per yard, delivered.
Thames Ballast	6 0	" "
Best Portland Cement	31 0	per ton, delivered.
Best Ground Blue Lias Lime	22 0	" "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime	10s. 6d. per yard, delivered.
Stourbridge Fire-clay in sacks, 27s. 0d. per ton at rly. dpt.	

STONE.

	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld. rly. depot
Bath "	1 7	" "
Farleigh Down Bath	1 8	" "
Beer in blocks	1 6	" "
Grinshill "	1 10	" "
Brown Portland in blocks	2 2	" "
Darley Dale in blocks	2 4	" "
Red Corsehill "	2 5	" "
Closeburn Red Freestone	2 3	" "
Red Mansfield "	2 4	" "
Hard York in blocks	2 10	" "
" " 6 in. sawn both sides landings, to sizes (under 40 ft. sup.)	2 8	per ft. super. at rly. depôt.
" " 6 in. Rubbed Ditto	3 0	" "
" " 3 in. sawn both sides slabs (random sizes)	1 3	" "
" " 2 in. self-faced Ditto	0 9½	" "
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube. deld. rly. depôt.
" " " 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt.
" " " 3 in. do.	1 2½	" "

SLATES.

in. in.	£ s. d.	
20×10 best blue Bangor	12 0 0	per 1000 of 1200 at ry. dep
" best seconds "	11 10 0	" "
16×8 best "	6 17 6	" "
20×10 best blue Portmadoc	11 7 6	" "
16×8 best blue Portmadoc	6 5 0	" "
20×10 best Eureka unfading green	13 10 0	" "
16×8 " "	7 10 0	" "
20×10 permanent green	10 10 0	" "
16×8 " "	6 0 0	" "

TILES.

	s. d.	
Best plain red roofing tiles	41 6	per 1,000, at rly. depôt.
Hip and valley tiles	3 7	per doz. " "
Best Broseley tiles	48 6	per 1,000 " "
Hip and valley tiles	4 0	per doz. " "
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 " "
Do. ornamental Do.	60 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3	" " "
Best Red or Mottled Staffordshire Do. (Peakes)	50 9	per 1,000 " "
Hip tiles	4 1	per doz. " "
Valley tiles	3 8	" " "

WOOD.

BUILDING WOOD.—YELLOW.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	14 10 0	16 0 0
Deals: best 3 by 9	13 10 0	15 0 0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	10 10 0	11 10 0
Battens: best 2½ by 6 and 3 by 6	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0 0	less than best
Battens: seconds	0 10 0	" " "
2 in. by 4 in. and 2 in. by 6 in.	8 10 0	9 10 0
1¼ by 4½ in. and 2 in by 5 in.	8 0 0	9 0 0
Foreign Sawn Boards— 1 in. by 1½ in. by 1½ in.	0 10 0	more than battens.
¾ in.	1 0 0	"
Fir timber: Best middling Danzig or Memel (average specification)	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft.)	3 0 0	3 10 0

[*See also page 219.*

COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
Additions, &c., to Infirmary	Newark Guardians	21*l.*	Oct. 14
*Infectious Diseases Hospital	Strood R.D.C.	15 guineas	Oct. 15
*Designs for University Buildings, Cape of Good Hope	Agent-Gen. for Cape of Good Hope	400*l.*, 200*l.* and 100*l.*	Jan. 31

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, &c., Supplied by	Tenders to be delivered
Alterations to a Building, Cardiff	Great Western Railway Co.	G. K. Mills, Paddington Station, London	Sep. 9
Drainage Works, &c., Potton, Beds	Biggleswade R.D.C.	Taylor, Sons & Crimp, Civil Engineers, 27, Great George-st., S.W.	do.
Road Works, Victoria-road	Bromley (Kent) U.D.C.	F. H. Norman, Council Offices, Bromley	do.
Sanitary Work at Workhouse	Belfast Guardians	Young & Mackenzie, Engineers, Belfast	do.
Sewerage Works, Stratton, Wilts	Highworth R.D.C.	Beesley & Co., Engineers, 11, Victoria-street, S.W.	do.
*Road Making and Paving Works	Bromley U.D.C.	Council's Surveyor, Bromley, Kent	do.
Waterworks, Bowes, near Barnard Castle	Startforth R.D.C.	J. E. Parker, Civil Engineer, Post Office Chambers, Newcastle	Sep. 10
Cast Iron Pipes	Swadlincote U.D.C.	G. B. Smedley, Gas Works, Swadlincote	do.
Wall, &c., Knighton	Plympton St. Mary R.D.C.	F. W. Cleverton, 4, Buckland-terrace, Plymouth	do.
Infirmary, Stapleton	Bristol Guardians	H. P. Adams, Architect, 28, Woburn-place, London, W.C.	do.
Hospital, Penmore, Hasland	Chesterfield Hospital Committee	G. E. Bolshaw, Architect, 189, Lord-street, Southport	do.
Sewerage Works, Pinner	Hendon R.D.C.	J. A. Webb, Civil Engineer, Stanmore	do.
Five Cottages, Carlton, near Wakefield	Leeds Co-operative Society	J. W. Fawcett, 10, Albion-street, Leeds	do.
Alterations to Greyhound Inn, Pontefract	Messrs. Beverley Bros., Ltd.	W. Hurst, Architect, Pontefract	do.
School, Bargoed, Wales	.....	T. Roderick, Architect, Aberdare	do.
Drainage Works, Maesteg, Margam	.....	F. B. Smith, Civil Engineer, Port Talbot	do.
Asylum Extension, Gartloch	.....	A. Skirving, Architect, 121, West Regent-street, Glasgow	do.
*New Sorting Office, Walthamstow	Commissioners of H.M. Works, &c.	J. Wager, H.M. Office of Works, Storey's Gate, S.W.	Sep. 11
Cast Iron Pipes	Salford Corporation	Borough Surveyor, Town Hall, Salford	do.
Macadam (1,000 tons)	Grays Thurrock U.D.C.	A. C. James, Surveyor, Council Offices, Grays	do.
Surveyor's Materials	Ramsbottom (Lancs) U.D.C.	T. H. Bell, Surveyor, Council Offices, Ramsbottom	do.
Stabling, &c.	Ebbw Vale (Mon.) U.D.C.	T. J. Thomas, Engineer, Ebbw Vale	do.
School, near Cardenden, Fife	Auchterderran (N.B.) Sch. Brd.	W. Williamson, Architect, 220, High-street, Kirkcaldy	Sep 12.
Paving Works	Halifax Corporation	J. Lord, Civil Engineer, Town Hall, Halifax	do.
Bridge, Attercliffe	Sheffield Corporation	C. F. Wike, Civil Engineer, Town Hall, Sheffield	do.
Granite and Flints	Stains U.D.C.	E. J. Barrett, Civil Engineer, Town Hall, Stains	do.
Street Works, Granville-street, &c.	Woodford (Essex) U.D.C.	W. Farrington, Surveyor, Woodford Green	do.
Hospital, Stretton	Hereford R.D.C.	T. Llanwarne, 8, St. John-street, Hereford	do.
Synagogue, Osborne-street, Hull	.....	Ansdell & Cox, Architects, 50, Savile-street, Hull	do.
Lavatory, &c., Blackley	Manchester Corporation	City Architect, Town Hall, Manchester	do.
Additions to Dundarroch House, Pitlochry	.....	J. Leonard, Architect, Pitlochry	do.
Alterations to Public Hall, Rhos, Wales	.....	J. T. Jones, 51, Mountain-street, Rhos	do.
Boundary Walls, &c., Sabden, Lancs	.....	Mr. Gregson, Surveyor, Padiham	Sep. 13
House, New-road, Dowlais	Messrs. Victor & Morris	T. Roderick, Architect, Merthyr	do.
Alterations to Chapel, Troedyrhiw, Wales	.....	W. Lloyd, 5, Beech-grove, Troedyrhiw	Sep 14
Rebuilding the School, Llwyncelyn, Porth, Wales	.....	J. Rees, Architect, Pentre, Glam.	Sep. 15
Sewers, Whiterock-road	Hastings Corporation	P. H. Palmer, Civil Engineer, Town Hall, Hastings	do.
Sewer, St. Helen's-road	do.	do.	do.
Drainage Works	Northallerton R.D.C.	W. Fowle, Council Offices, Northallerton	do.
Granite Road Metal (1,100 tons)	Felixstowe U.D.C.	F. B. Jennings, Town Hall, Felixstowe	do.
*Cottages, Iron Shed, Gates, Fencing, &c.	Hendon U.D.C.	Council's Surveyor, The Burroughs, Hendon, N.W.	do.
Business Premises, Chapel Brow, Leyland	Industrial Co-operative Soc., Ltd.	The Secretary, Society's Offices, Golden Hill, Leyland	Sep. 16
Alterations, &c., Eastridge, Cowfold, Sussex	.....	W. Buck, Architect, Horsham	do.
*Wood-paving Works	Willesden District Council	Council's Engineer, Dyne-road, Kilburn, N.W.	do.
*Making-up Lysia-street	Borough of Fulham	Borough Surveyor, Town Hall, Fulham, S.W.	Sep. 17
*Unclimable Iron Railing, Oak Cleft Fencing with Gates	West Ham Union	The Clerk, Union Workhouse, Leytonstone, N.E.	do.
*Drainage Works	Tonbridge R.D.C.	W. V. Graham, Engineer, 5, Queen Anne's Gate, S.W.	do.
Road Works, &c., Cranley Gardens, Wallington	Croydon R.D.C.	R. M. Chart, Surveyor, Town Hall, Croydon	do.
*Buildings at Gasworks	Devonport Corporation	Borough Surveyor, 29, Ker-street, Devonport	Sep. 18
Wrought Iron Fencing	Hastings Corporation	P. H. Palmer, Civil Engineer, Town Hall, Hastings	do.
*Converting Railway Arch into Stables, Ewer-street	Southwark Union	G. D. Stephenson, Architect, 13 and 14, King-street, E.C.	do.
*New Municipal Buildings	Woolwich Borough Council	A. B. Thomas, Architect, 5, Queen Anne's-gate, S.W.	do.
Water Supply, Folkton	Sherburn R.D.C.	F. H. Read, 26A, Dean-street, Scarborough	Sep. 19
Cast Iron Pipes (1,100 tons)	Leigh (Lancs) Corporation	J. Foster, Engineer, Gas Offices, Leigh	Sep. 20
Sewerage Works	Burnley R.D.C.	S. Edmondson, Surveyor, 18, Nicholas-street, Burnley	do.
School, Sang-road	Kirkcaldy School Board	W. Williamson, Architect, 220, High-street, Kirkcaldy	do.
*Tar-paving at Horton Asylum, Epsom	London County Council Asy. Com.	Clerk of the Committee, 6, Waterloo-place, S.W.	do.
*Stores, Cart & Van Sheds, Lodge, & Public Urinals	Stepney Borough Council	Borough Engineer, 15, Great Alie-street, E.	Sep. 22
*Board Room, Offices, Receiving Home for Children, &c.	Hammersmith Guardians	J. H. Richardson, Architect, 87, Finsbury-pavement, E.C.	Sep. 23
*Hot-water Heating Apparatus, Park Hospital	Metropolitan Asylums Board	Office of the Board, Embankment, E.C.	Sep. 24
*Laundry, Bansted-road School, Sutton	do.	Newman & Newman, 31, Tooley-street, London Bridge, S.E.	do.
*New Entrance Gates, &c., N.E. Hospital, Tottenham	do.	Office of the Board, Embankment, E.C.	do.
*Workmen's Dwellings, Yeldham-road	Borough of Hammersmith	Borough Surveyor, Town Hall, Broadway, Hammersmith	do.
*Laboratories in Duke-street, Chelmsford	Essex County Council	County Architect, Duke-street, Chelmsford	Sep. 25
Sewers, Bridge-street	West Hartlepool Corporation	J. W. Brown, Borough Engineer, West Hartlepool	Sep. 26
Workhouse, &c., Wesham, Lancs.	Fylde Guardians	Haywood & Harrison, Architects, Accrington	Sep. 30
*Making-up Roads	Tottenham U.D.C.	Council's Engineer, 712, High-road, Tottenham	do.
*Extensions to Vulcan Iron Works, Derby	Ley's Malleable Castings Co., Ltd.	E. R. Ridgway, Architect, Long Eaton, Notts	No date
Peareth Arms, High-street, Gateshead	Messrs. Wears & Watson	L. H. Armour, 16, West-street, Gateshead	do.
Rebuilding Premises, Waterloo-st. Newcastle-on-Tyne	Co-operative Society, Ltd.	F. E. L. Harris, Architect, 1, Balloon-street, Manchester	do.
Sinking Pit, Groeswen, Wales	.....	Secretary, Groeswen & Caradog Collieries, Ltd. 49, Queen Victoria-st.	do.
Four Cottages, May Place-road, Bexley Heath	.....	W. F. Potter, Architect, 18, York-grve, Queen's-rd., Hatcham, S.E.	do.
Church, Corporation-road, Darlington	.....	W. J. Morley & Son, Architects, 269, Swan-arcade, Bradford	do.
Warehouse, Whitehall-road, Leeds	.....	Smith & Tweedale, Architects, 12, South-parade, Leeds	do.
*Schools at Newport-road	Aldershot School Board	The Clerk, Station-road, Aldershot	do.
*Road Making Works, Stafford	Siemens Bros. & Co., Ltd.	Buckland & Garrard, 8, Fredericks-place, Old Jewry, E.C.	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Required.	Salary.	Application to be in
*Architect's Assistant	Borough of Ealing	2*l.*	Sep. 17
*Second-class Draughtsman	Board of Agriculture Civ. Ser. Com.	Not stated	No date

PRICES CURRENT (*Continued*).

WOOD.

JOINERS' WOOD.	At per standard. £ s. d.	£ s. d.
White Sea: First yellow deals, 3 in. by 11 in.	22 0 0	23 0 0
2 in. by 9 in.	20 0 0	21 0 0
Battens, 2½ in. and 3 in. by 7 in.	16 10 0	18 0 0
Second yellow deals, 3 in. by 11 in.	18 0 0	20 0 0
,, ,, 3 in. by 9 in.	16 10 0	18 10 0
Battens, 2½ in. and 3 in. by 7 in.	13 0 0	14 0 0
Third yellow deals, 3 in. by 11 in. and 9 in.	14 0 0	15 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	20 0 0	21 0 0
Do. 3 in. by 9 in.	17 0 0	18 0 0
Battens	13 0 0	14 0 0
Second yellow deals, 3 in. by 11 in.	15 0 0	16 10 0
Do. 3 in. by 9 in.	13 10 0	14 10 0
Battens	11 0 0	12 0 0
Third yellow deals, 3 in. by 11 in.	12 10 0	13 10 0
Do. 3 in. by 9 in.	12 0 0	13 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	14 0 0	15 0 0
,, ,, 3 in. by 9 in.	13 0 0	14 0 0
Battens	11 0 0	12 0 0
Second white deals 3 in. by 11 in.	13 0 0	14 0 0
,, ,, ,, 3 in. by 9 in.	12 0 0	13 0 0
,, ,, ,, battens	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 1	0 0 0
Yellow Pine—First, regular sizes..	32 0 0	33 10 0
Broads (12 in. and up)	2 0 0	more.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube..	0 3 6	0 4 6
Danzig and Stettin Oak Logs—Large, per ft. cube	0 6	0 3 0
Small ,, ,,	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube..	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7½	0 0 8
¾ in. do. do.	0 0 7	- - -
Dry Mahogany—		
Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	16 0 0	20 0 0
American Whitewood Planks—Per ft. cube	0 3 0	0 3 6
Prepared Flooring—	Per square.	
1 in. by 7 in. yellow, planed and shot	0 13 0	0 16 6
1 in. by 7 in. yellow, planed and matched	0 13 6	0 17 6
1¼ in. by 7 in. yellow, planed and matched	0 15 0	1 0 0
1 in. by 7 in. white, planed and shot	0 11 0	0 12 6
1 in. by 7 in. white, planed and matched	0 11 6	0 13 6
1¼ in. by 7 in. white, planed and matched	0 13 6	0 15 6

6 in. at 6d. per square less than 7 in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders ,, ,,	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Flitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 0

METALS.

IRON—	Per ton, in London. £ s. d.	£ s. d.
Common Bars	7 15 0	8 5 0
Staffordshire Crown Bars, good merchant quality	8 5 0	8 15 0
Staffordshire "Marked Bars"	10 10 0	- - -
Mild Steel Bars	9 0 0	9 10 0
Hoop Iron, basis price	9 5 0	9 10 0
,, ,, galvanised	16 0 0	- - -
(* And upwards, according to size and gauge.		
Sheet Iron, Black.—		
Ordinary sizes to 20 g.	10 0 0	- - -
,, ,, to 24 g.	11 0 0	- - -
,, ,, to 26 g.	12 10 0	- - -
Sheet Iron, Galvanised, flat, ordinary quality.—		
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	12 15 0	- - -
,, ,, 22 g. and 24 g.	13 5 0	- - -
,, ,, 26 g.	14 5 0	- - -
Sheet Iron, Galvanised, flat, best quality:—		
Ordinary sizes to 20 g.	16 0 0	- - -
,, ,, 22 g. and 24 g.	16 10 0	- - -
,, ,, 26 g.	18 0 0	- - -
Galvanised Corrugated Sheets.—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	- - -
,, ,, 22 g. and 24 g.	13 5 0	- - -
,, ,, 26 g.	14 5 0	- - -
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	12 0 0	- - -
,, ,, 22 g. and 24 g.	13 0 0	- - -
,, ,, 26 g.	14 5 0	- - -
Cut nails, 3 in. to 6 in.	9 5 0	9 15 0
(Under 3 in. usual trade extras.)		

LEAD, &c.

	Per ton in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. & up.	13 15 0	- - -
Pipe in coils	14 5 0	- - -
Soil Pipe	16 15 0	- - -

PRICES CURRENT (*Continued*).

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
ZINC—Sheet—		
Vieille Montagne ton	24 5 0	- - -
Silesian	24 0 0	- - -
COPPER—		
Strong Sheet per lb	0 0 10	- - -
Thin ,,	0 0 11	- - -
Copper nails ,,	0 0 11	- - -
BRASS—		
Strong Sheet ,,	0 0 9	- - -
Thin ,, ,,	0 0 10	- - -
TIN—English Ingots ,,	0 1 3½	- - -
SOLDER—Plumbers' ,,	0 0 6½	- - -
Tinmen's ,,	0 0 8½	- - -
Blowpipe ,,	0 0 9½	- - -

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
,, fourths	2d. ,, ,,
21 oz. thirds	3½d. ,, ,,
,, fourths	3d. ,, ,,
26 oz. thirds	4½d. ,, ,,
,, fourths	3¾d. ,, ,,
32 oz. thirds	5½d. ,, ,,
,, fourths	4¾d. ,, ,,
Fluted sheet, 15 oz.	3d. ,, ,,
,, 21 ,,	4d. ,, ,,
½ Hartley's Rolled Plate	1¾d. ,, ,,
⅜ ,, ,, ,,	2¾d. ,, ,,
½ ,, ,, ,,	2¾d. ,, ,,

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes or barrels	per gallon	0 2 9
,, ,, ,, in drums	,,	0 3 0
Boiled ,, ,, in pipes or barrels	,,	0 2 11
,, ,, ,, in drums	,,	0 3 2
Turpentine, in barrels	,,	0 2 10
,, in drums	,,	0 3 0
Genuine Ground English White Lead	per ton	21 0 0
Red Lead, Dry	,,	20 0 0
Best Linseed Oil Putty	per cwt.	0 8 6
Stockholm Tar	per barrel	1 12 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 6
Superfine Hard-drying Oak, for Seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Superfine Pale Copal Body	1 4 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

TO CORRESPONDENTS.

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article is given subject to the approval of the article, when written, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays.* N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

ARDEE (Ireland).—For the erection of a corn store for Mr. Henry Hale. Mr. P. Cahill, architect, Seatown-place, Dundalk:—

First Tender.

Mathews & Keenan	£530
J. McGuiness	380
Hubert Henley	320

Second Tender.

J. McGuiness	£350
J. Malone	311
Hubert Henley, Balbriggan*	285

BETHESDA (Wales).—For additions, &c., to waterworks, for the Urban District Council of Bethesda. Mr. Evan Evans, C.E., Carnarvon, N. Wales. Quantities by Engineer:—

R. A. Crowe	£988	Hugh Griffith, Cydgoed	
Wm. Thomas	968	Aber, Bangor*	£815

BRISTOL.—For the erection of school premises, Minaroad, for the School Board. Mr. H. Dare Bryan, architect, 38, College-green, Bristol. Quantities by Mr. W. L. Bernard, St. Stephen's Chambers, Baldwin-street, Bristol:—

Builder's Work.

E. Love	£5,860	Stephens, Bastow, & Co.	£5,199
W. Church	5,789	Wilkins & Son	5,098
Down & Son	5,450	S. Williams	4,920
E. Clark	5,447	G. Humphreys, Bristol*	4,900
Eastabrook & Son	5,320		
E. Walters	5,290		

Plumber's Work.

A. E. W. Blissett	£581	J. Wilkins	£523
J. E. B. James	555	A. S. Scull	522
A. J. Vaughan	553	S. H. Povey	521
A. E. Wilkins	529	G. F. Tuckey, Bristol*	518

CHRISTCHURCH (Hants).—For the erection of a house, &c., Fairmile, for the Guardians:—
Jenkins & Sons, Ltd., Bournemouth £1,602

COVENTRY.—For the execution of roof works, Market Hall, for the Corporation. Mr. J. E. Swindlehurst, Engineer, St. Mary's Hall, Coventry:—

Ewart & Son	£1,261	Helliwell & Co., Brighouse, Yorks*	£882
Braby & Co.	993	Plant & Co.	810
Kelley & Son	972	Taylor & Co.	771

FINEDON.—Water-supply works, Finedon. Messrs. Mosley & Scrivener, engineers, Fish-street Chambers, Northampton:—

Contract No. 1.—Water Tower.

R. Cosford	£2,269	Berrill & Green	£1,822
J. T. Wingrove	2,184	Hacksley Bros.	1,781
W. T. Wilmott	1,925	T. Titmus	1,760
W. Higgins	1,909	R. Marriott	1,730
H. Shardlow	1,895	F. Henson	1,695
Goodman & Murkett	1,867	T. Swindall	1,657
A. J. Chown	1,850	G. Henson	1,650
C. R. Pettitt	1,844	O. P. Drever, Kettering*	1,439

Contract No. 2.—Steel Tank and Girders.

Manlove, Alliott, & Co.	£1,400	J. F. Blakeley	£972
A. Dodman	1,121	H. Shardlow	900
Westwood & Wright	1,116	Dixon & Fish	860
D. Rowell	998	Renshaw & Co.	780
Johnson & Wright	980	G. Thompson	759
		J. Thompson, Dudley*	740

Contract No. 5.—Engine House and Cottage.

H. Shardlow	£734	Hacksley Bros.	£587
R. Cosford	684	W. Higgins	586
J. T. Wingrove	654	F. Henson	580
W. G. Wilmott	623	Berrill & Green	565
R. Marriott, jun.	620	J. Titmus	525
A. J. Chown	600	O. P. Drever, Kettering*	503
Goodman & Murkett	598		
G. Henson	597		

Contract No. 7.—Reservoir.

R. W. Barker	£2,484 9 8
C. R. Pettit	2,367 0 0
R. Cosford	2,100 0 0
W. W. Bolton	2,098 0 0
J. T. Wingrove	2,025 0 0
A. J. Chown	1,995 0 0
R. Marriott, jun.	1,910 0 0
Hacksley Bros.	1,889 0 0
F. Henson	1,888 0 0
Willmott	1,869 0 0
H. Shardlow	1,862 0 0
Goodman & Murkett	1,847 0 0
G. Henson	1,795 0 0
T. Swindall	1,655 0 0
W. Higgins	1,552 0 0
Berrill & Green	1,536 0 0
J. Titmus	1,355 0 0
O. P. Drever, Kettering*	1,259 11 0

Contract No. 8.—Iron Pipes.

W. W. Bolton	£2,116	Dixon & Fish	£1,913
Watson, Gow, & Co.	2,062	Sheepbridge Coal & Iron Co., Chesterfield*	1,773
R. W. Barker	1,952		
Stanton Iron Works	1,946		
H. Shadlow	1,913		

Contract No. 9.—Laying Pipes, &c.

	Original Tender.	Tender revised.
W. Higgins	£2,372 0	—
R. W. Barker	1,958 0	—
T. Swindall	1,875 0	—
W. G. Willmott	1,861 0	—
R. Marriott, jun.	1,825 0	—
G. Henson	1,800 0	—
F. Henson	1,760 0	—
W. W. Bolton	1,610 0	—
Lea & Warren	1,607 0	—
O. P. Drever	1,311 0	—
Dixon & Fish, Kettering*	1,304 12	£1,322 2
R. Cosford	1,228 0	1,463 0
H. Shardlow	1,203 0	1,346 14
J. T. Wingrove	1,188 0	1,414 10

GREAT YARMOUTH.—Home for twenty nurses at the Great Yarmouth Union Workhouse, for the Guardians. Mr. Arthur S. Hewitt, architect, Bank-chambers, Great Yarmouth:—

Bray	£2,468	Smith Bros.	£2,270
Everitt	2,410	J. Eastoe	2,267
Beech	2,388 10 6	Pestell	2,237 10
Read	2,364 15	Carter & Wright	2,229
Jary	2,323	J. D. Harman	2,138 15
Rand	2,299 14	Dawson*	2,061
Willimont	2,285		

[All of Yarmouth.]

[*See also next page.*

LEEDS.—For the erection of shed, shops, &c., at Antwerp Mills. Mr. C. S. Nelson, architect, 15, Park-row, Leeds :—

Esdras Wales, Armley, Leeds* £556 12 8

[Fourteen tenders received.]

LONDON.—For building workshops in Hollybush-gardens, for Mr. J. Joseph. Mr. Edward Brown, architect, 150, Minories, E.C. :—

W. G. Brown....	£1,378 19	Bishop.....	£1,185 0
Johnson Bros. ..	1,218 10	H. Hood*	1,130 0

LONG EATON.—For the erection of an engine-house and rope race, for the Harrington Mills Co. Mr. John Sheldon, architect, Darley House, Long Eaton. Quantities by the architect :—

Williamson & Co.	£826	Hutchinson & Son	£780
F. Messom	806	Perks & Son, Long Eaton*	770
Youngman & Son	795		

MINERA (Wales).—For additions to police-station, for the Denbighshire County Council. Mr. R. L. Williams, architect, Denbigh. Quantities by County Surveyor :—

S. Moss, Coedpoeth, near Wrexham £183 4

OSSETT (Yorks).—For taking down and rebuilding house, Haggs Hill. Messrs. C. H. Marriott, Son, & Shaw, architects, Church-street Chambers, Dewsbury :—

Masonry.

Tolson & Sons, Ossett* £245 0

Joinery.

J. W. Harrap, Gawthorpe, Ossett* 62 0

Plumbing.

J. Walshaw, Batley* 21 0

Slating.

W. H. Thompson, Batley* 18 15

Plastering.

H. Sanderson, Ossett* 17 0

Painting.

H. Sanderson, Ossett* 8 0

SEBERGHAM.—For first part of new residence, Sebergham Castle, for Mr. C. J. Wilkinson, M.A. Mr. A. B. Plummer, architect and Diocesan Surveyor, Newcastle and Tynemouth :—

G. Black, Carlisle* £2,895 7 6

SWINDON.—For extensions to technical school buildings, Victoria-road, for the Corporation. Messrs. Bishop & Pritchett, architects, Regent-circus, Swindon :—

C. Williams	£2,477 0	A. J. Colborne ..	£2,346 8
H. & C. Spackman	2,418 0	J. Williams..... ..	2,300 0
		J. G. Norman* ..	2,272 0

[All of Swindon.]

SWINDON.—For the erection of higher elementary school buildings, Euclid-street, for the School Board. Messrs. Bishop & Pritchett, architects, Regent-circus, Swindon :—

R.E. Rudman	£10,700 0 0	J. Williams ..	£8,428 9 0
McCarthy E. Fitt	9,246 0 0	A. J. Colborne	8,409 0 0
H. & C. Spackman.	8,629 0 0	C. Williams, Swindon* ..	8,356 17 10

TODMORDEN.—For the erection of school and house, Shade. Messrs. Sutcliffe & Sutcliffe, architects, Todmorden. Quantities by architects :—

Masonry.—Oldfield Watson, Hebden Bridge	£3,697 0
Concreting.—Greenwood & Sons, Halifax	655 0
Steelwork.—Dorman, Long, & Co., Manchester	292 0
Joinery.—M. Mallison, Todmorden....	788 0
Wood Block.—Dean & Sons, Burnley	173 0
Slating and Plastering.—T. Blacka, Todmorden	299 10
Painting.—T. Blacka, Todmorden	59 10
Plumbing.—T. Davis, Todmorden	350 0
Folding Partitions.—Unity Wood and Iron Co., Padiham.....	116 10
Blackboards—A. & S. Wheater, Leeds	35 0
Iron Railing, &c.—Geo. Ashworth, Burnley.....	149 0

TOTNES (Devon).—For the execution of road works, carriage drive, &c., Higher Washbourne, Halwell. Mr. R. Montague Luke, C.E., engineer, 15, Princess-square, Plymouth :—

Shillabear.....	£650 0 0	W. E. Bennett ..	£202 8 9
Harris & Leigh‡	241 5 0		

‡ Without repairs to existing walls, £226 5s.

WOKING.—For the erection of a house, Januay Hill, Woking, for Mr. F. H. Wenham. Messrs. William G. Jones & Clinton, architects, Woking and Farnborough :—

J. Whitburn	£3,737 10	Harris & Son* ..	£3,619 0

WOODFORD (Essex).—For the execution of road works, Sunset-avenue, &c., for the Urban District Council. Mr. Wm. Farrington, Surveyor, Council Offices, Woodford Green, Essex :—

Parsons & Parsons	£1,097 17 9
W. Griffiths'& Co.	1,090 4 11
J. Mesdon	1,044 1 11
W. & C. French, Buckhurst Hill* ..	1,038 6 6

[Surveyor's estimate, £1,075.]

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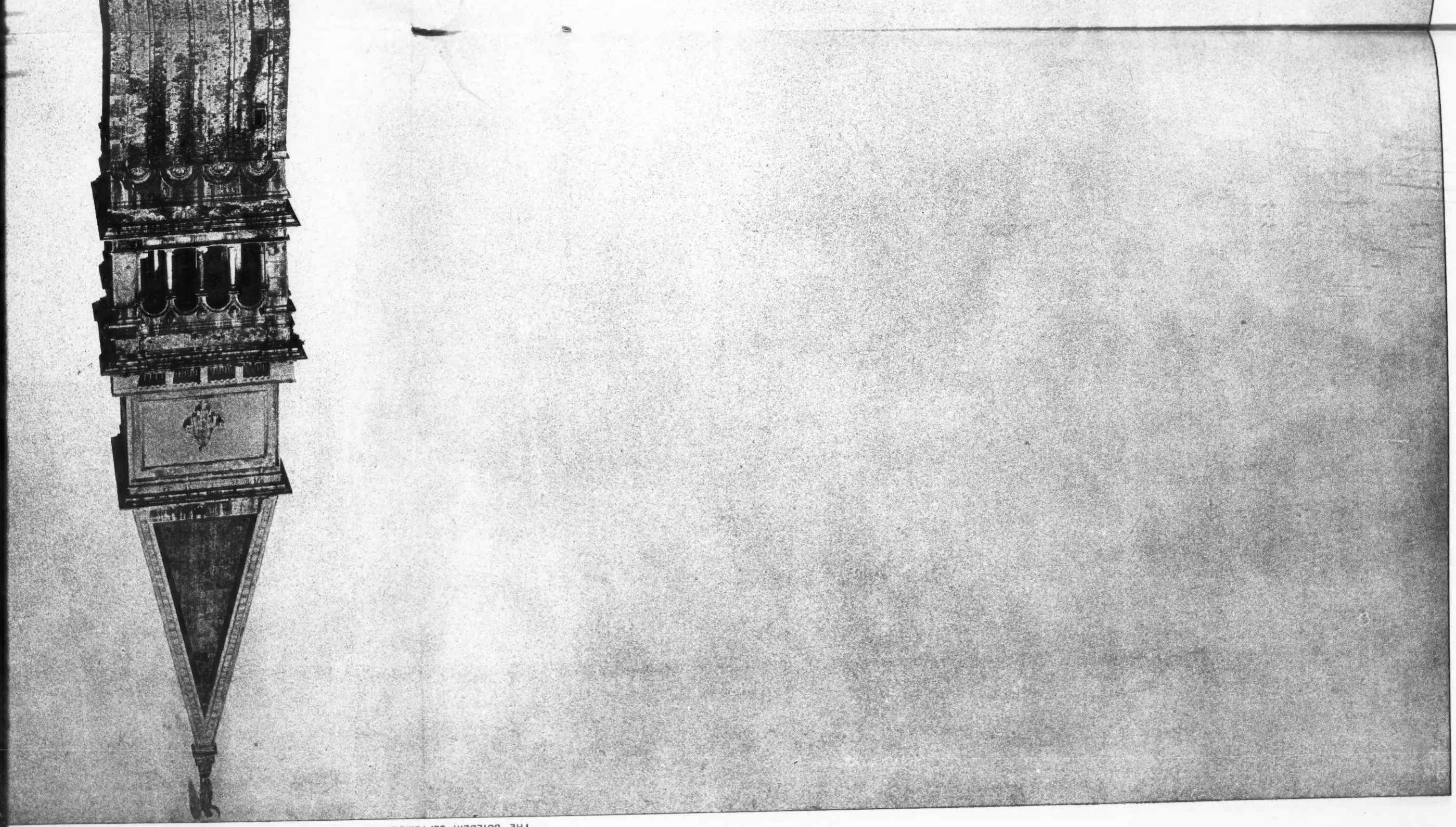

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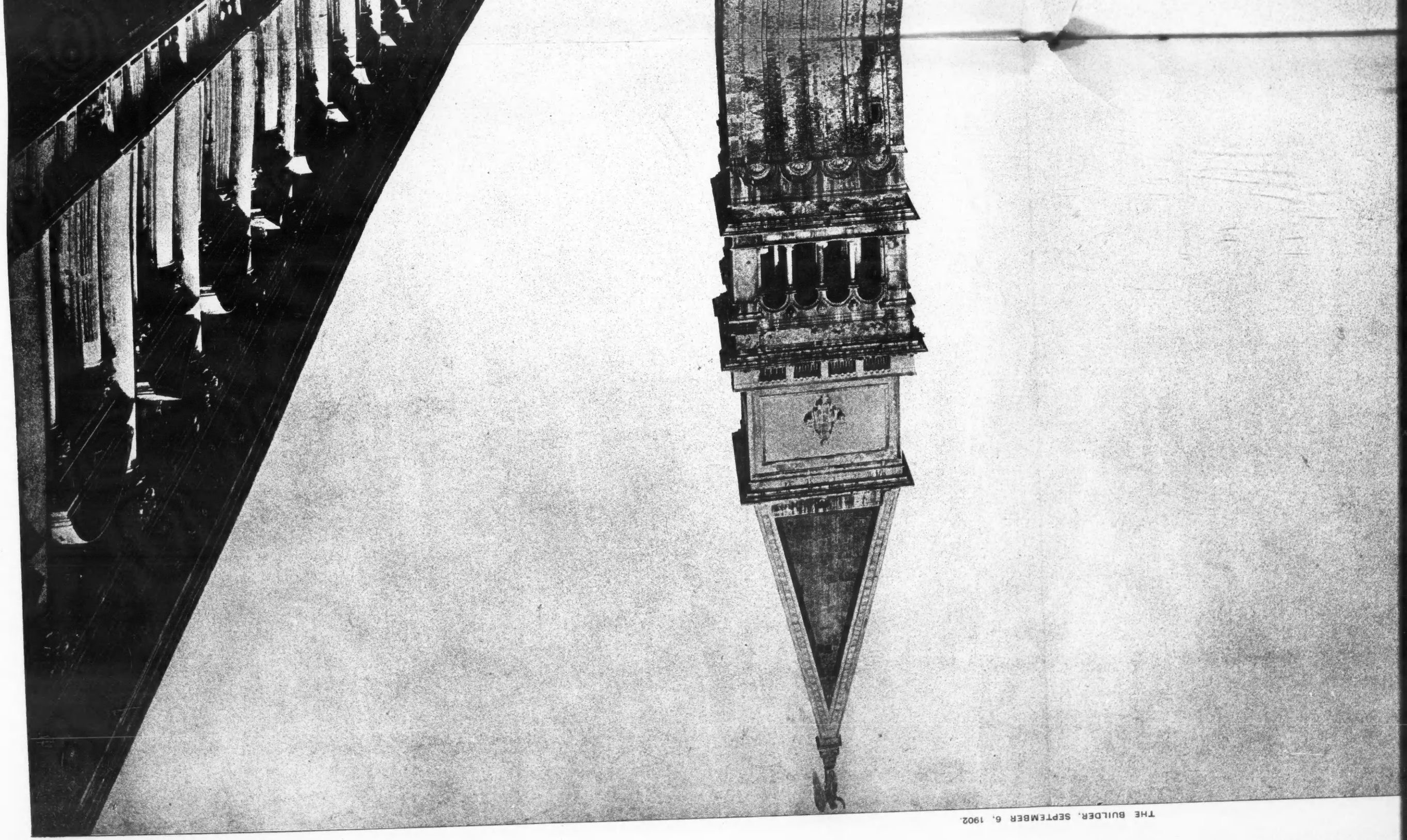

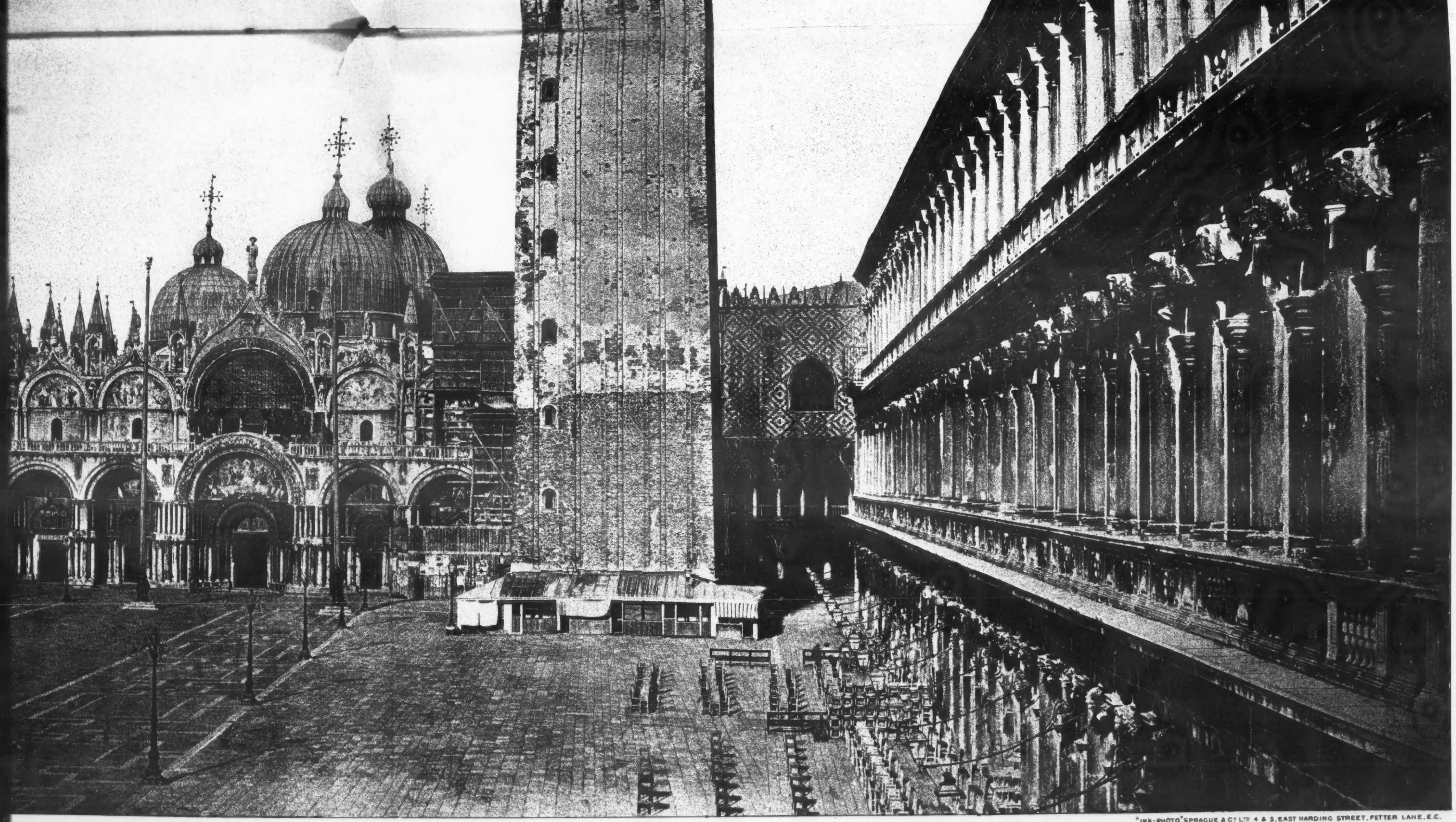

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